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# THE SURGICAL CLINICS OF NORTH AMERICA

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Volume 7

Number 4

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## FOREWORD

THE following pages are intended to represent a cross section of some of the problems and activities of the several divisions of the Department of Surgery of a general hospital in a large city

While no attempt has been made to present the unusual, we have, nevertheless, purposely omitted some of those subjects which have been so thoroughly discussed during the past few years. Gastric and duodenal ulcer, biliary disease, appendicitis, empyema, goiter, etc., constitute a large share of the surgical work of this institution, and yet it seemed of more value and interest to us to portray some of the less frequently discussed phases of our work. The material contained herein represents fairly well the routine character of certain types of surgery observed and cared for in The Brooklyn Hospital, and is for the most part, collected from cases or studies of groups of cases presented by various members of the staff at the weekly conferences of the department.

The Surgical Service of The Brooklyn Hospital is organized and conducted as a unit, in which its several branches or surgical specialties, as well as its relation to the Medical Service and Laboratories, are so correlated as to ensure adequate co-operation or team work, and it is to be hoped that these pages may reflect in some measure the fundamental aim or purpose of the institution in its attempt to utilize these resources in the interest of the patient.

WALTER A. SHERWOOD

*Director of the Department of Surgery*



## PRACTICAL USE OF THE FROZEN SECTION METHOD

NICHOLAS M. ALTER

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THE frozen section method of rapid tissue diagnosis is in continuous use on the operating floor of The Brooklyn Hospital, and has proved to be of considerable practical value in many instances. This method not only furnishes a rapid means of diagnosis but also brings in close contact the pathologist and clinicians, whose mutual interest in the cases is thus greatly increased from both scientific and practical standpoints. In addition to the personal touch, the pathologist gains by obtaining all the clinical information possible, which is useful in making a rapid diagnosis and subsequent study; the clinicians are benefited not only by the rapid diagnosis, which facilitates a decision as to the course of treatment, but also by the increased interest which goes with observing the histologic evidences. The interest is greater, naturally, if the cases are worked up immediately, instead of by a long process, as the study of the consequent new cases is bound to detract from the pathologic interest of a busy surgeon. It is obvious that ultimately it is the patient who derives most of the benefit of all these.

A histologic laboratory is equipped in immediate proximity to the operating rooms. The specimens are brought here without delay, and examined grossly and microscopically within a few minutes, during which the operation may be suspended. Rapid fixation of the chosen tissue block is effected by boiling. The frozen sections are stained with Unna's polychrome methylene-blue, then checked up with hematoxylin and eosin stain; they are then permanently mounted in balsam.

The timed co-operation of technician and pathologist will cut down the required time to a very few minutes.



In the great majority of cases quick and reliable results have been obtained, and these are checked up by subsequent long histologic methods

The following case may serve as a typical illustration. It is understood, of course, that in cases with advanced and obvious pathology the surgeon may easily dispense with such assistance from the pathologist

Mrs. L. A. B., aged sixty-one, entered The Brooklyn Hospital in January, 1927, with the complaint of "lumps in right breast"

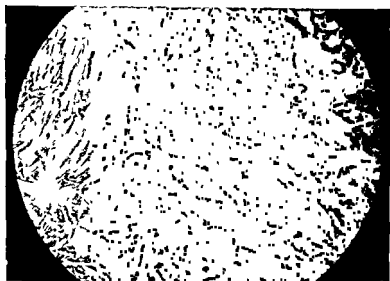


Fig. 350 — Photomicrograph of frozen section showing scirrhous carcinoma of breast. Magnification about 80

She first noticed these in December, 1926. On admission the nipple showed nothing unusual, was not retracted, axillary nodules were not palpable. Numerous irregular hard lumps were felt in the left breast, hardest in lower inner quadrant, one of them 1 cm. in diameter. A clinical diagnosis of chronic mastitis was made.

Operation of simple mastectomy, at first, was decided upon, and performed in January, 1927. Gross examination of the most suspicious hard nodule, on cross-section, showed a scar like

indurated area about  $1\frac{1}{2}$  cm in diameter. Immediate frozen section proved this area to be typical scirrhous carcinoma with the narrow strands of small dark epithelial cells which were surrounded by a considerable amount of dense stroma (Fig 350). There was only a negligible delay in the operation, which therefore, was conducted along safe lines.

Limitations of the frozen section method, although not very common, must be taken into consideration. The limited time for instance, permits the microscopic examination of only a few sections. The following case demonstrates this and also shows interesting contrast to the previous case.

Mrs. A. C., aged thirty six, was admitted on May 16, 1926 with the complaint of "swelling of left breast." At the time of her admission the patient was nursing an infant of six months. During the first months of her pregnancy both breasts became quite swollen and secreted milk rather profusely for one or two days, after this the right breast became normal again, but the left remained slightly larger. In the third month masses appeared in the medial and lateral quadrants and these gradually increased in size. On admission she had no pain in the breast and had lost no weight, but complained of pain in her back.

Physical examination on admission showed an obese woman. Both breasts were large and pendulous, the left slightly larger and firm. Edematous masses were felt in medial and lateral quadrants nearly filling breast. No tenderness found. No axillary nodules were palpable. Operation was performed by Dr. Sherwood on May 17th. After simple mastectomy the breast was submitted to pathologic examination and diagnosis with frozen sections.

Three frozen sections from different suspicious areas showed no suggestion of malignancy.

Subsequent careful pathologic examination resulted in the following report:

S. P., 455. Breast weighs 2800 gm. It is covered by large skin surface, which measures 25 x 25 cm. Nipple is prominent. Skin shows no lesion. From the numerous cross sections rich milky secretion is discharged. (No obvious growth is found.)

One can feel numerous irregular finer indurated areas throughout breast. On cross section these firm areas prove to be partly glandular masses partly dense tendinous scars with smaller and larger cysts ( $\frac{1}{2}$  to  $2\frac{1}{2}$  cm). These cysts contain chocolate like hemorrhagic material. There is edema everywhere. The edema is most extensive in the lower portions.

A series of microscopic sections from the various firm portions show hyperplastic glandular tissue as seen in lactation. Some of the cystic cavities are lined by numerous layers of large epithelial cells sometimes almost filling the lumen. There is a considerable amount of stroma surrounding the groups of glands, in this much edema and inflammatory infiltration is seen, with lymphocytes and eosinophils.

Some of the sections show a diffuse epithelial invasion which surrounds the hyperplastic glands. The glandular arrangement is still preserved in most part, but on the border there is transition of the growth into narrow strands of small dark cells.

*Pathologic Diagnosis*—Scirrhus carcinoma of lactating breast—chronic cystic mastitis.

In the case of such a large breast (2800 gm) where lactation and a diffuse old inflammatory process with cysts produced a maze of pathology, a slow careful method with a rather large series of histologic sections will be required. The few sections that could be afforded in the short time available are not sufficient to give reliable results.

It may be mentioned that x ray examination, made shortly after a diagnosis was made, showed rather extensive metastasis to dorsal vertebrae. This metastasis occurred apparently rather early and before any axillary involvement through the lymphatics was obvious. This feature, as well as the coincidence of the cancer with lactation in the breast of a comparatively young woman, is of some interest.

Just as every lump in the breast is looked upon with suspicion, irregular uterine bleeding after the menopause makes one think of malignancy. In this field, again, the frozen section method has proved to be of real value, helping to define the

clinical course in early cases when decision is most desirable and in no other way obtainable

Mrs M B aged fifty four She has had irregular vaginal bleeding for the past two or three years Dilatation and curettage were performed by a surgeon in May, 1926 Patient was told she was all right When complaints continued, she was admitted to this hospital, where dilatation and curettage were done on November 11, 1926 At this time vaginal examination revealed a small introitus Cervix seemed to be healthy Corpus uteri was the size of a small orange, movable No involvement of adnexa Uterine cavity 4 inches in depth and wall smooth

The age and symptoms naturally aroused suspicions of malignancy, but no further evidence was to be obtained by clinical methods

November 19, 1926 curettage of uterine cavity was performed by Dr W S Smith A small amount of material was obtained with the curet which was soft and did not give any gross evidence of malignancy

Immediate histologic examination of frozen section showed a malignant epithelial growth with glandular arrangement (Fig 351) Numerous mitotic figures were easily made out

As the patient was opposed to hysterectomy, radium treatment was decided on to check the growth temporarily, and 50 mg of radium were applied for twenty four hours After consent was obtained, radical panhysterectomy was performed on January 5, 1927

*Pathologic Report*—Specimen consists of a uterus and appendages Uterus is that of a multipara It measures 10 x 4 x 4 cm Shape is normal Cervix is long and narrow Mouth of cervix is round and narrow, surrounded by about an inch of thin and soft vaginal mucosa On opening, a villous growth is seen in the upper right corner of the uterine cavity, it projects slightly over the surface ( $1\frac{1}{2}$  inches in diameter) Below this some yellow necrosis is seen Mucosa of cervix is smooth and there is considerable blood clot in the uterine cavity On cross section the growth is invading the deeper layers for about 1 cm Uterine wall averages 2 cm Broad ligament shows no firm

areas. Both tubes are uniformly thin. Right ovary is very hard in consistency. On cross-section it seems to consist of a single cyst about  $3\frac{1}{2}$  cm in diameter. This has smooth lining and contains hard, rubbery blood-clot. The other ovary is small—3 cm in diameter. Cross section shows dense fibrous tissue. No evidence of follicles.

Microscopic section of the uterine wall shows a malignant epithelial growth with typical glandular structure. The growth, however, shows extensive degeneration. There are a few mitotic



Fig. 351.—Photomicrograph of 'frozen section' of uterine curettage showing adenocarcinoma of fundus uteri. Magnification about 80.

figures and extensive fibrosis and inflammatory reaction, mostly with plasma-cells and lymphocytes. All these are probably the effect of radiation. Numerous sections of the broad ligament show no evidence of the malignant growth. Tubes show nothing unusual except some lymphocytic infiltration. Section of the ovary shows no germinal cells, but extensive fibrosis and hyalinization also of the blood-vessels.

*Pathologic Diagnosis*—Adenocarcinoma of fundus uteri. Normal tube. Fibrosis and hyalinization of ovary.

The radium had apparently checked the growth for the six weeks prior to the hysterectomy. The growth after this period was not only small in size and apparently at an early stage but also showed marked degeneration following radium treatment. At the time of curettage it was evidently at a very early stage. This case may also illustrate that light curettage for diagnosis does not aggravate uterine malignancy.

It is beyond the limits of this discussion to go into greater details in an attempt to enumerate the manifold applications of this method as it has been used at The Brooklyn Hospital.

The limitations of the method are also quite obvious. It is evident from the examples given that in many cases a series of sections is required. Early uterine cases often yield a small amount of tissue, which may also be in part normal. The slow method is safer in such cases, but such emergency may be met by embedding in jelly, and then applying the frozen section method. The method has to be used judiciously, however, in all cases, particularly when finer cellular studies are required, as in lymphosarcoma, Hodgkin's disease, etc. The slower histologic methods must be employed when the consistency of the material makes embedding into uniformly firm matrix necessary, as illustrated in fat, bone marrow, and blood clot.



## ACQUIRED ATRESIA OF THE UTERINE CERVIX

FLIOT BISHOP

---

THIS subject will be treated in its strictest sense, it will not include stenosis, as is sometimes done, nor will it include even the cases acquired after the use of radium for, in most instances, the application of that agent, through its ovarian effect, does not produce hematometra

Little attention has been paid this subject in the text books, or in current literature, as was noted by Pemberton of Boston in a *more comprehensive* paper entitled '*Acquired Atresia of the Vagina and Cervix*,' read before the Brooklyn Gynecological Society in May, 1924, and published in November of that year in the *American Journal of Obstetrics and Gynecology*. A fairly generous cross section of the literature made by the writer supports his contention

In an American edition of the English author—Churchill's "*Diseases of Females*"—published in 1844 there is no reference to the subject. Thirty years later Hewitt, in "*Diseases of Women*," refers to the subject, giving the trauma of labor or an operation as the cause. His advice in reference to surgical attack is general, to say the least. "We endeavor to find the os uteri, and not succeeding in this, search is made for the cervix. We may fail in discovering any trace of either, the distention of the uterus having obliterated all trace of both." He ends by cautioning avoidance of bladder or rectum.

Thomas in '*Diseases of Women*' in 1875, makes no reference to atresia. Reed, in his "*Gynecology*" of 1891 only casually refers to it, and gives no specific help for surgical interference. Pozzi, in his "*Gynecology*," gives more attention to the subject, and from his bibliography we would conclude that it had been met with fairly often. E. C. Dudley, in 1902 in his '*Gynecology*,'



notes only congenital atresia of the cervix. Among the recent textbooks, Graves, in his 1924 edition of "Gynecology," mentions cervical atresia only incidentally to general pelvic atrophy from endocrine dysfunction. Crossen in "Diseases of Women," published in 1923, discusses atresia only as the cause of hematometra, no reference being made to the cause of the atresia. Blair, in "Gynecology" of 1925 makes this matter only a part of general atresia of congenital origin.

In current literature there is no reported case in Surgery, Gynecology and Obstetrics since 1918. In the American Journal of Obstetrics and Gynecology since its inception in 1920 there is only the paper previously referred to by Pemberton, and a case reported by Salatich before the New Orleans Gynecological and Obstetrical Society, and published in the August, 1925, issue. His case was an atresia following an amputation by a previous operator, he must have been given to thought on the subject as he said that his own practice to prevent such an occurrence is to place a deep lateral silkworm gut suture.

Because of the paucity of literature on the subject two cases will be presented that recently have come to our attention: one following a plastic operation upon the cervix and the other following an operative labor and postpartum sepsis. Two other patients can be referred to in this connection with atresia from criminal abortions, one of my own had a temporary atresia, but finally nature with increased intra uterine tension spontaneously cured it; the other, a patient of Dr. Herman Grad of the Woman's Hospital, had six abortions within a short period, and hematometra developed, for which he did a hysterectomy, this uterus I saw him demonstrate at a staff meeting and I hope he will report it.

The first patient, thirty years of age, has an irrelevant previous history, except that four years ago she had an operative labor with a stillbirth. Five or six months later she had a dilatation curetment and repair of the cervix. Leukorrhea was present for awhile after labor but is absent now. The menses, which had been regular and normal up to the pregnancy, have never returned. However, at irregular but definite intervals,

she complains of severe pain in the pelvis lower abdominal distention and increased nervous and mental irritability On vaginal examination she shows a fairly good pelvic floor except for slight cystocele The cervix is the site of an apparently repaired bilateral laceration, with some scarring on the left side of the vaginal vault There was no eversion or erosion however and on inspection it appears to be a good result The fundus is of normal size and in second degree retroversion, no adnexal masses are palpable, from her history it seems best to attempt to demonstrate the cervical canal however a very small probe not more than  $\frac{3}{4}$  inch will penetrate it From these findings this must be classed as a postoperative atresia of the cervix As her symptoms are not severe enough to force this woman to seek surgical relief there can be little backing up of menstrual flow and it seems a fair presumption that nature through the reflexes of the sympathetic nervous system produced an early menopause This is analogous to atrophy of the kidney after accidental ligation of a ureter

The second patient came for consultation in October 1923 complaining of amenorrhea since the onset of a pregnancy in July 1924 Her other complaints were anal incontinence of gas an intermittently blood tinged leukorrhea and pain in the left iliac region, she had no bearing down pain or backache Her previous history to the time of labor was negative except that menstruation was slightly irregular—every four or five weeks Her labor on April 19 1925 was hard ending operatively with a stillbirth and followed by five weeks in bed Examination at this time showed a very obese woman upon whom bimanual palpation was difficult and probably inaccurate There was a relaxed pelvic floor, with a slight cystocele a moderate proctocele and with only a small portion of the sphincter intact The cervix could not be seen, but seemed to be barely palpable high up in the vault other observers could not find it at all The uterus was estimated to be small and in good position adnexal masses were palpated Atresia of the cervix seemed and later was proved to be present and operation to re establish the canal and to repair the pelvic floor was advised

She entered The Brooklyn Hospital early in November, and had a repair of the pelvic floor, an excellent result being obtained. The report of the examination at the time, under the anesthetic, was "extensive laceration of the left lateral wall to and across the cervix, involving the vaginal wall to the right side—the cervix uteri being completely missing and no opening could be found into the uterus" (Fig. 352)



Fig. 352—Schematic sagittal section of second patient showing (a) Presumptive loss of tissue at labor (heavy dotted line), (b), hematometra (light dotted line) and restoration of uterus to normal size

On January 22, 1926 she was seen again, and she reported good control of the anal sphincter, and also menstrual symptoms at times. Examination showed an excellent pelvic floor, the cervix palpable but not visible, the fundus large and sinistroverted, she was advised to have an attempt made to open the canal. On February 3, 1926, under an anesthetic, the uterus was found to be about 5 x 4 inches in size, ante- and sinistroverted, the mass of the cervix apparently palpable, but no os

seen or felt. With a sound in the bladder and a sponge on a stick in the rectum, the cervical mass, small in diameter, was brought down and three false (apparently, at the time) passages were made in an attempt to locate the uterine canal. She left the hospital the next day, five days later she had five hours of severe cramps followed by a sudden gush of profuse very malodorous blood, this soon changed to bright red and continued for seven days, being worse when she was recumbent. Beginning March 17th she flowed four days, with no preliminary cramps and has had none since. On April 23d, while flowing she presented herself for examination, which was done in the knee chest position, blood was seen to come from a dimple of small size on the vaginal vault, an ordinary uterine sound was not passable. With the patient in the dorsal position, with a bivalve speculum in place, it appears as in Fig 353. What looks not unlike a cervix after a Sturmdorf tracheloplasty is really the bulging vaginal vault. This condition has continued until the present writing—the spring of 1927. Her subsequent menstrual history is that for six months she had apparently normal periods every thirty two days. She had no period from August until the middle of October, and then she flowed quite profusely, with pain and clots. This was presumed to have been an early miscarriage, but, as it occurred at home, it was not proved. Since then she has had periods as before.

There was partial success in treating this patient, and by that is meant the re establishment of menstruation, if a full term pregnancy should result, irrespective of the type of delivery, it would be called complete. It must be admitted that what success was obtained was due to temerity and good fortune. In the future, with a similar case, a more definite plan would be followed. Pemberton, in the article referred to, comprehensively includes atresia of the vagina and cervix, and also stenosis of these organs. However, atresia of the cervix from operation or labor did not appear in his series. For treatment he quotes from Dartigue in "Paris Chirurgie" for 1922 a plan of attack on atresia of the cervix as follows: "The bladder is stripped back from the front of the cervix up to the uterovesical

ligament or higher, as necessary, care being taken not to open the peritoneum. The cervix is incised longitudinally until the canal is found, and an amputation done at a suitable height to remove all the obliterated canal and scar tissue leaving a patent opening to the uterine canal.

A somewhat similar, but more finished suggestion was made by one of our assistant gynecologists, Dr John J. Madden,

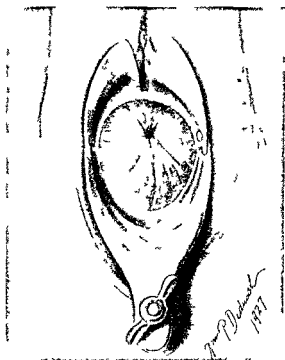


Fig. 353.—Appearance of vaginal vault of second patient in January 1927 after eleven months of menstruation.

that the cervix if palpable be isolated by a circular incision, as if for a conical cervical resection or a vaginal hysterectomy, the bladder and the rectum may then be dissected from the cervix, with it laid bare and isolated, the canal would be located and opened with more assurance and safety. The method of re-establishing and keeping patent the os would be determined thereupon.

## CHRONIC ULCERATIVE COLITIS (ACUTE EXACERBATION)

WILLIAM B. BRINSMADE

---

L. P., a well nourished woman, fifty two years of age, who had never complained of being ill, was seized with sharp abdominal pain. She had taken a walk in the afternoon and eaten an ordinary dinner with her family. She took a cathartic, which was followed by a satisfactory bowel evacuation. The pain continued, however, and the next evening she commenced to have bloody stools. There was no vomiting. Rectal tenseness with the passage of large quantities of bloody mucus continued with increasing severity. The total amount of blood lost was large.

Three days later examination showed a patient with markedly distended abdomen, and boggy over the ascending and descending colon. There was tenderness in right lower abdomen. Pulse rate, 120, temperature, 99° F, respiration, rapid. There was moderate edema of both legs. She had the facies of a very sick patient. The whole picture was that of an acute abdominal condition, which demanded exploration.

On opening the abdomen, a large mass of omentum was found densely adherent in the right iliac fossa. When this mass was freed between ligatures, a collapsed coil became dilated, gas passing into the dilated coils beyond. The small intestine was generally collapsed, and showed many small hemorrhagic spots. The ascending colon was large and edematous. The descending colon was much distended with thickened, boggy walls. There was no evidence of pathology in the appendix, gall bladder, or stomach. The uterus contained multiple small fibroids. The tubes and ovaries were normal.

The abdomen was closed and the patient left the table in fair condition. About two hours later the heart beats became

very weak. She developed pulmonary edema, vomited blood, and passed a large quantity of blood by rectum. She died three hours later.

#### CLINICAL DISCUSSION

With the symptoms of intestinal obstruction and peritonitis the bloody stools were suggestive of gangrene. This was not found. On the other hand the surprising feature at operation was the massive edema of the entire colon and adjacent abdominal wall. This lesion was so conspicuous that it recalled to one's mind immediately angioneurotic edema of the visceral type.

The history of the patient has been investigated carefully. She had been quite well, apparently, up to the time of the visceral crisis with colicky pain and bloody stools. There were no abdominal masses palpated and none found at the operation.

Without any further clinical or pathologic evidence the diagnosis of visceral angioneurotic edema or intestinal purpura seemed most probable. We were aware that this diagnosis was not convincing on account of the lack of past history of similar attacks.

#### PATHOLOGIC DISCUSSION

##### N F ALTER

*Autopsy*—Body is that of a well developed female. Cyanosis of face and fingernails is particularly marked. Abdomen is slightly distended. There is a surgical wound 20 cm in length running near the midline between symphysis and umbilicus. The wound is dry and held together by sutures.

On opening the abdominal cavity, the intestines are normally dispersed slightly and uniformly distended by gas. Distention of cecum and sigmoid is most marked. The entire colon has thick edematous walls. Its diameter averages  $8\frac{1}{2}$  cm. There are dense fibrous adhesions between ascending and descending colon and abdominal wall. This is most marked at the splenic flexure. There is slight excess of free abdominal fluid which is clear and straw colored. Liver extends 6 cm beyond costal margin.

*Heart*—Weight 320 gm. Right heart is distended and filled with a great deal of "chicken fat." Wall of left ventricle meas

ures 12 mm that of the right 4 mm Heart muscle is flabby,

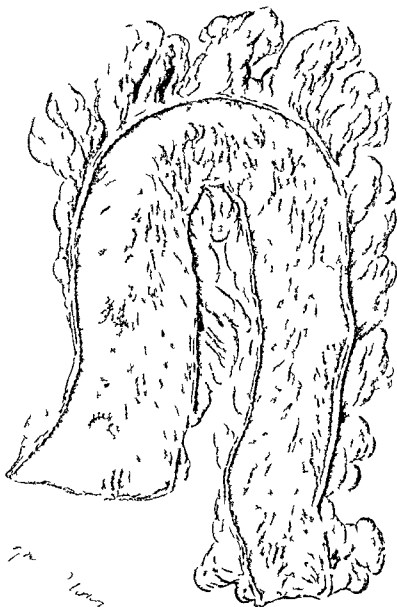


Fig 354 —Drawing of section of large bowel showing chronic ulcerative process in mucosa hypertrophy and edema of mesentery and appendices epiploica

breaks down easily on pressure It is yellowish brown in color Heart otherwise shows nothing unusual



white scars and numerous ulcers of recent origin was a surprising pathologic finding in view of the lack of past history. The adhesions of the omentum and colon are due obviously to this old process. This attack was probably brought about by recent intestinal infection as evidenced by the extensive superficial ulceration of the colon.

## THROMBOPHLEBITIS OF THE LATERAL SINUS COMPLICATING MASTOIDITIS

CLAUDE G CRANE, JOHN M TAYLOR, AND HARRY H PATRIE

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SEPTICEMIA, occurring in the course of mastoiditis, is a complication that often calls for quick decision and prompt action on the part of the surgeon. It is not an extremely rare occurrence, and any hospital with a large ear service has each year several of these cases, presenting an interesting variety of problems in their management.

From reading the literature one is led to infer that the formation of a clot in the lateral sinus is the cause and prerequisite for the development of septicemia in mastoid infections. This is not true. The thrombosis is nature's protective mechanism, and is successful in those cases where the clot remains uninfected.

Cases are seen in which while doing a simple mastoid operation an extradural perisinus abscess has, by its mere pressure, caused obstruction and thrombosis in a purely mechanical manner, without giving rise to any symptoms of septicemia whatever. When the focus of bony infection has been removed and the abscess drained it may remain uninfected.

The classical type of case is that in which the extension of the bony disease finally reaches the vessel and infects its outer wall. Nature at once proceeds to fortify and protect the lumen of the sinus by deposition of layers of clot until it is occluded. This thrombus in such close proximity to an infected vessel wall is extremely liable to become itself infected and thus cause micro organisms and gross particles of infected clot to be carried into the general circulation. When symptoms of sepsis occur in the course of mastoiditis it is this pathologic condition that we are most likely to encounter.

But there are rarer cases in which septicemia occurs in disease of the temporal bone without obvious infection of the sinus wall or obstruction of its lumen by clot. These are of a fulminating type. We must not be misled by the fact that there is no clot in the sinus. The patient in the course of a mastoid disease suddenly develops all the symptoms of a blood stream infection with chills, high intermittent rises of temperature and profuse sweating and the micro organism causing the infection, usually the hemolytic streptococcus, is found in the blood. The large venous trunk is found normal, unobstructed by clot. We recall, however, the many small short veins in the bone, any one of which may contain a small infective thrombus and which may also produce the disease by liberating its contents into the unobstructed sinus. The indications for operative intervention in this type are especially imperative and urgent—to do at once what nature has failed to accomplish—cut off this area from the general circulation by ligating the jugular vein and blocking off the distal end of the lateral sinus.

Three cases are herewith reported. One under the care of Dr. Patrie in which, while doing a simple mastoid operation, there was found a very extensive thrombosis and in which there were not, at any time, symptoms of septicemia; one of Dr. Crane's cases in which there was a thrombophlebitis of the sinus with blood stream infection, and the other a case of Dr. Taylor's of the fulminating type with septicemia and pyemia without thrombosis of the sinus.

#### CASE I ACUTE MASTOIDITIS COMPLICATED BY EPIDURAL AND PERISINUS ABSCESS AND LATERAL SINUS THROMBOSIS

REPORTED BY HARRY H. PATRIE

This patient, J. H. W., is fifty-four years of age, laborer, and of Irish nationality. He was first seen in The Brooklyn Hospital Dispensary on December 27, 1925. Four weeks prior to admission to the dispensary he contracted a bad cold in the head, and two days later developed a severe earache on the left side. In twenty-four hours the ear drum ruptured and a profuse discharge of yellowish-white pus ensued. The pain disappeared,

but the discharge continued to be profuse until two days before admission, when it stopped and he developed pain over his mastoid bone, accompanied by swelling which pointed near the center of his mastoid. During these four weeks he had had a slight fever at times, and gave a history of sweats and chilly sensations, but no high fever, chills, vertigo, or headaches. On the day of admission the swelling over his mastoid bone was pointing and broke, allowing the escape of considerable amount of yellowish-white pus. A deep sinus was exposed, through which a probe could be passed for a distance of  $2\frac{1}{2}$  inches into the mastoid cells and in the the direction of the antrum. The ear drum was perforated and there was considerable drainage from the middle ear. There was some tenderness over the mastoid bone in the area of the antrum, the tip, and the emissary vein, but very little pain. There was no vertigo, nausea, vomiting, or headache present. His temperature was  $98.6^{\circ}$  F., pulse 80, respirations 20. The right ear was normal, and his nose, throat, and sinuses revealed nothing abnormal.

He was advised to go into the hospital at once for a mastoidectomy, but he refused, saying that he felt too well to be operated upon, and that he wished to talk the matter over with his family. Two days later he came back to the dispensary and consented to the operation.

Upon admission to the hospital a general examination revealed nothing abnormal with the exception of his left ear, already described. His temperature was  $98.6^{\circ}$  F., pulse 80, and respirations 20. A blood-count showed the following: Hemoglobin, 70 per cent.; red blood-cells, 4,800,000; white blood-cells, 11,950; polymorphonuclears, 85 per cent.; lymphocytes, 15 per cent. Urine examination normal. An x-ray was not taken, as there was a positive diagnosis of acute mastoiditis. His past medical history and family history were negative.

The regular mastoid incision was made, going through the sinus area. The skin and periosteum were retracted, and a large area of necrotic bone with a large sinus was exposed in the antral region. A probe could be passed through this sinus down to the antrum. All necrotic bone and granulation tissue were carefully

removed. Above the knee of the lateral sinus, between the tegmen and the sinus, there was a large abscess from which  $\frac{1}{2}$  ounce of pus was obtained. In this situation the dura was exposed for an area the size of a quarter, dark in color, and an equal area of lateral sinus wall. The sinus wall was black in color and contained several large holes, through which a probe could be passed into the lumen. The whole sinus was then uncovered from the jugular bulb to a short distance from the torcular part. It was perforated in several places and contained a thick black necrotic substance, evidently broken down clot. A probe could be passed into the sinus in many places without causing bleeding. The internal jugular vein was ligated above the facial vein and then the whole lateral sinus was opened from near the bulb to as near the torcular part as possible. All the necrotic tissue was removed and bleeding promoted from both ends. These ends were closed with gauze plugs and the whole wound packed with gauze.

The plugs were removed on the fourth day without further bleeding and the wound allowed to granulate. On the seventh day he was discharged from the hospital and referred to the dispensary for dressings, and on the thirtieth day the wound was entirely healed and the patient was discharged as cured.

The interesting features about this case are the severity of the findings with the lack of symptoms pointing to them. Here is a man doing hard labor, walking around feeling too well to consent to an operation, with normal temperature, pulse, and respirations though having a large epidural and perisinus abscess, and with a thrombosed and necrotic lateral sinus. His convalescence was uneventful, his temperature, pulse, and respiration remaining normal throughout. His blood culture was sterile and the culture from the mastoid showed *Staphylococcus aureus* and long chain streptococcus. This evidently accounts for the lack of typical symptoms of infective sinus phlebitis.

## CASE II. LATERAL SINUS THROMBOPHLEBITIS WITH BRAIN ABSCESS

REPORTED BY CLAUDE G CRANE

E C, age twenty three years, first seen June 7, 1919, at which time he gave a history of having had a discharge from the left ear while at Camp Wadsworth in August, 1917 Had received no treatment since June, 1918

Examination showed marked nasal obstruction due to malformation of the septum, infected tonsils, and a large amount of adenoid tissue

*Right Ear*—Profuse discharge, and a polypus filled the inner third of canal

*Treatment Advised*—Correction of nasal obstruction, removal of tonsils and adenoids, and removal of aural polypus

June 13, 1919 Aural polypus removed, which revealed the drum to have been destroyed and the middle ear to be full of granulation tissue Measures other than conservative local treatment were refused at this time The ear was treated four times following removal of polypus, and patient was not seen again until April 1, 1920 On this date a submucous resection of the septum was done, and the tonsils and adenoids removed Following this the ear was treated at intervals The radical mastoid operation was strongly advised The patient did not return until March 14, 1923, at which time he had a return of the aural polypus, and again a radical mastoid operation was advised This was refused The polypus was removed, followed by occasional treatments until July, 1923 On December 9, 1925 he was again seen after an absence of eighteen months He gave a history of having had pain in the ear the night before A polypus was found in the ear similar to the condition found on the previous occasions There was slight mastoid tenderness Removal of polypus was done

Admitted to The Brooklyn Hospital December 11, 1925

*Diagnosis*—Mastoiditis (chronic) Lateral sinus thrombophlebitis Bacteremia

On admission he complained of considerable pain The discharge had increased during the two weeks previous to his

admission The physical examination was negative except for the local condition

On the night of December 13, 1925 he had a violent chill, and temperature rose to 105° F On December 14th a radical mastoidectomy was done The lateral sinus was found to be infected, thrombosis being present The jugular vein was ligated above the facial vein, and the lateral sinus opened and thrombosis removed A blood culture was taken just before the operation, which showed *Streptococcus viridans* 50 colonies per cubic millimeter Culture taken December 23 1925 was sterile

A blood transfusion was done two hours after operating and a second transfusion was done four days after operation The postoperative convalescence was very satisfactory the blood becoming sterile and the temperature soon becoming normal A fairly normal blood picture was maintained after operation by transfusions

The laboratory reports were as follows

*Urinalysis*—Negative

*Blood*—December 18, 1925 Hemoglobin 95 per cent, erythrocytes, 5 400,000, leukocytes, 23 200, polymorphonuclears, 85 per cent, small lymphocytes 2 per cent, large lymphocytes, 2 per cent, transitional cells 11 per cent

December 19, 1925 Broth culture *Streptococcus viridans* shows 50 colonies

December 26 1925 Result of examination Broth agar P L O T sterile

Discharged January 9, 1926, improved

Patient readmitted on February 12 1926

*Tentative Diagnosis*—Encephalitis, meningitis possible brain abscess

On admission he was in a somewhat confused and semi conscious state During the period since discharge from the hospital he was apparently well up to one week previous to admission, at which time he complained of headache and localized pain referred to occiput, posterior mastoid and parietal areas

Laboratory report was as follows

*Urinalysis*—Negative

*Blood*—February 18, 1926 Leukocytes 36 700, polymorphonuclears, 90 per cent, small lymphocytes, 10 per cent, large lymphocytes 10 per cent

Result of examination of spinal fluid 580 cells per c mm  
Many endothelial cells found Globulin 1+ Sugar, no reduction No acid fast bacilli found

Neurologic examination by Dr Eastman resulted in a diagnosis of meningitis and encephalitis, but there were no symptoms pointing to a localized area of brain involvement or brain abscess The blood culture and spinal fluid were negative for bacteria Death ensued on February 20, 1926

*Postmortem Examination of Brain*—On removing brain strong adhesions are found at the left cerebellopontine angle At this place and also at the left cerebellum marked congestion of the meninges is seen There is slight general edema of the meninges, which otherwise, however, show nothing unusual The large venous sinuses of the skull are found empty On opening the middle areas the cavity is found dry There is no exudate in them Brain weighs 450 gm There is swelling and congestion over the left lobe of the cerebellum and left side of the pons Numerous horizontal cross sections were made There is a large abscess cavity in the left lobe of the cerebellum This extends almost to the cortex and the surface of the pons It is 6 cm in length involving the entire fourth ventricle The abscess is about 4 cm in width No trace of the fourth ventricle is seen It forms part of the abscess The abscess is lined by thick necrotic tissue It is filled with foul smelling, thick, purulent, and necrotic material It is evidently old The sylvian canal is dilated, the ventricular system of the brain beyond the canal is also slightly distended, but the lining of the system is smooth and pale It contains clear fluid

*Comments*—If radical mastoidectomy had been done when first advised in April, 1920, or in March, 1923, it would have effectually prevented the subsequent developments A period of sixty eight days ensued from the date of the lateral sinus operation to death from brain abscess The pathologist re



ported the abscess of long duration. At no time during the period of sixty days from the date of the operation to the date of second admission to the hospital was a brain abscess suspected. On admission three days before death no symptoms of a localized brain lesion were in evidence. The abscess was believed by the pathologist to have been metastatic rather than due to direct extension from ear or mastoid.

The sinus thrombophlebitis and the bacteremia were successfully treated but we failed to recognize the existence of a brain abscess.

### CASE III SEPTICEMIA AND PYEMIA COMPLICATING ACUTE MASTOIDITIS

JOHN M TAYLOR

This little boy D J four years old was the subject of a bilateral acute ear suppuration when a year old. A year and a half later he had another acute ear involvement associated with an upper respiratory infection. Following this his tonsils and adenoids were removed and he was free from ear trouble until the middle of March 1926.

Then he developed influenza and again had a complicating acute otitis in both ears. Drainage was early established by paracentesis but ten days after the onset he had definite signs of mastoid involvement on the left side and on March 27th a simple mastoid operation was performed by me at The Brooklyn Hospital. At the end of two weeks on April 10th he returned home.

At this time nearly a month after the onset of his infection there was still a profuse discharge from the other ear. The advisability of doing a simple mastoid operation on that side was considered but the x ray examination showed the outlines of the mastoid cells still distinct. He was feeling well and it was decided not to operate although the persistent free discharge was an indication for doing so.

He was up and about and out of doors for two or three weeks after his discharge from the hospital and the aural discharge was diminishing. At this time he unfortunately acquired chicken

pox which diminished his resistance and then developed an other acute upper respiratory infection

Discharge from the right ear increased in amount Pain headache and tenderness over the mastoid appeared and on May 27th just two months after the left mastoid operation he was again admitted to The Brooklyn Hospital and a simple mastoid operation done on the right side In both these mastoid operations we found a large cellular bone with much necrosis and pockets of pus In each case the sinus wall and tegmen were firm and intact A culture of the pus showed the presence of long chain streptococcus

Following the operation the temperature which on admission was 102° F, rose to 103° and 104° F during the next two days, then for three days the patient was fairly comfortable and the temperature approached the normal level On June 2d six days after operation he became restless fretful and drowsy He felt chilly His temperature rose to 105° F followed by profuse sweating All this day and the next the temperature hung around 104° F with occasional chilly feelings The blood examination showed 25,000 leukocytes 79 per cent polymorpho nuclears Examination of the eye grounds by Dr Hargitt showed them entirely normal We had a blood culture taken and planted on three separate media

On June 4th in the early morning the temperature receded to normal and the patient seemed much better The blood culture at the end of twenty four hours had showed no growth But the temperature soon rose again to 104.6° F preceded by chill and followed by profuse perspiration for two hours

The fear we had had of a massive blood stream infection, aroused by these excessive jumps in temperature with chills and sweating and high leukocyte count were confirmed when twelve hours later a report from the laboratory showed that there had appeared a growth of hemolytic streptococci on two of the three culture media Almost simultaneously the temperature shot up to 107° F and we were fully aware that we were dealing with one of those dreaded fulminating types of blood stream infection

The patient was at once prepared and sent to the operating room. The right jugular vein was first exposed. It was quite normal in appearance and free from clot. It was ligated just above the facial branch and again about an inch higher up and the intervening portion excised. The mastoid wound was reopened, and the bony plate over the lateral sinus which still appeared firm and normal, was removed exposing the sinus for about  $1\frac{1}{2}$  inches of its length. There was no overlying abscess—no granulations or other evidence of phlebitis. A longitudinal incision was made. Free bleeding ensued. No clot in the lumen of the vessel. The bleeding was quickly controlled by pressure and an iodoform gauze pack was firmly placed between the sinus wall and the bone both distal and proximal to the incision. The time required for these operative procedures was one hour.

The condition of the little patient following the operation was poor as might be expected following this intervention on top of an overwhelming septicemia with the unusually high temperature of  $107^{\circ}$  F. His pulse was small thready—170. Respirations 84. Bathed in clammy, profuse perspiration. Caffein and morphin were used at once hypodermically. A hypodermoclysis of 150 c c of saline immediately followed. Six hours later a direct blood transfusion was administered by Dr Cochran.

The boy's reaction to this treatment for shock was encouraging. The pulse came down to 120 and the respirations to 44. But the two days immediately following the operation were very critical and anxious ones. He was given another direct blood transfusion of 300 c c on the second day. By the third day he was taking nourishment fairly well, and had pulled himself together to the extent that he was able to withstand a siege of another four weeks of sepsis, resulting from a metastatic abscess which in this short time had been implanted in a deep seated remote part of the body.

The operation had, however, fulfilled its purpose. Although the temperature ran a septic course for several weeks thereafter due to a bone infection in a distant area numerous blood

cultures taken at frequent intervals showed the blood to be sterile

The temperature did not return to normal after the operative attack on the sinus and jugular vein. For the first three days it rose respectively to 104°, 105°, and 106° F, and on June 8th, the fourth day postoperative the boy commenced to complain of severe pain in his right leg and foot. It was surmised that he had developed another pus focus but it was two weeks before this could be definitely localized and evacuated. The pain was referred to his leg and foot, and required morphin to control. Abdominal distention was present and at times quite troublesome.  $\alpha$  Rays and frequent examinations by colleagues on the pediatric, surgical, and medical services failed to localize it in the long bones, in the pelvis or in the abdomen. In the meantime, however, he took a good quantity of nourishment, and maintained good bodily and mental equilibrium. He had daily rises of temperature to 103° or 104° F, occasionally a little higher.

Finally an abscess was localized deep in the sacro iliac region and evacuated by Dr Sherwood.

This abscess contained thick, green pus that came through the great sacrosclatic foramen. A culture of this pus showed again the presence of hemolytic streptococcus.

Even after the evacuation of this collection of pus the patient still had pain and discomfort and intermittent rises of temperature to 103° or 104° F for another ten days, evidently due to a small area of osteomyelitis of the ilium. This secondary focus of suppuration in the sacro iliac region thus, for nearly four weeks, gave rise to a great deal of pain and discomfort, accompanied by a rather formidable temperature.

During this time the patient's resistance to the infection was indicated by the leukocytosis, which ran between 15,000 and 32,000 white cells. A careful watch was kept on the percentage of hemoglobin, for a secondary anemia must of necessity, result from such a prolonged sepsis, and on two occasions, when the percentage of hemoglobin fell below 50 per cent, he again received direct blood transfusions. Meanwhile the wound in

the neck had healed and the large postauricular wound filled in without any local complications

Finally on July 10th after a stay of six weeks in the hospital the boy went home and then to the seashore where his convalescence was rapid He continues in good health The ear drums are intact and his hearing is good in both ears

The case presented many difficult problems and called for judgment and prompt decisions I wish to make a few comments in this connection

First of all it is possible that this sequence of events might have been avoided After operation on his left mastoid he continued to have profuse discharge from the right ear that had existed for four weeks When an ear infection does not entirely clear up in that time I believe it good practice to urge a mastoid operation even though there are no other symptoms because an intercurrent respiratory infection may light up this focus and give us an acute mastoiditis with all the possible complications

The case demonstrates that a fulminating blood stream infection can occur without thrombosis in the lateral sinus and that prompt and efficient operative intervention will at once render the circulation sterile It must be prompt for in this case during the short interval that elapsed between the onset of symptoms and operation a metastatic focus was established that required all the patient's reserves to combat

Direct blood transfusions were found very efficient for two purposes—to combat shock and to maintain the percentage of hemoglobin

The management of this case was dependent in great measure upon the well-organized facilities of the hospital and I feel that any credit that may be deserved for the successful outcome should be shared with the Bacteriologic Department by whose reports we were guided from the first with the x Ray Department on which we frequently called for assistance and the blood transfusion team which is so well organized that this procedure is rendered most safe and simple We were also greatly assisted in the management of the case from the point

of view of maintaining the nutrition of the patient by the co operation of the Pediatric Division of the Department of Medicine

The management of the complicating sacro iliac abscess was in the hands of Dr Sherwood, the Surgeon in Chief

The successful outcome of this very interesting and difficult problem is an example of the efficiency of a well-organized hospital staff



## A CLINICAL REVIEW OF 100 CONSECUTIVE NEPHRECTOMIES

HENRY A. FISHER

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THIS is a brief summary of 100 cases in which nephrectomy was performed in the Urologic Division of the Department of Surgery of The Brooklyn Hospital in a five-year period, beginning January, 1920.

The cases were studied in the usual manner prior to operation, namely, history and physical examination; laboratory procedure, as indicated; cystoscopy and x-ray. The diagnoses under which they are grouped are those made by the pathologist. The instances in which they did not agree with the preoperative diagnosis are noted in the separate groups.

There were 32 cases of pyonephrosis; 29 cases of lithiasis; 24 cases of tuberculosis; 12 cases of new growths; 1 case of hydronephrosis in one portion of a horseshoe kidney; 1 of unilateral nephritis, and 1 of infarct.

There was an immediate mortality of 7 cases, or 7 per cent.

### PYONEPHRITIS

There were 32 of these cases, with two deaths, a mortality of 6.25 per cent. Twenty-four were in females and 8 in males. The youngest patient was nineteen, the oldest, sixty-five. According to decades, they were divided as follows:

| Decade  | Cases. |
|---------|--------|
| Second  | 2      |
| Third   | 7      |
| Fourth  | 12     |
| Fifth   | 3      |
| Sixth   | 4      |
| Seventh | 4      |



The symptoms in the order of frequency of occurrence were Pain frequency of urination pyuria fever dysuria hematuria night sweats nausea and vomiting Pain was present in all but 6 of the cases Symptoms referable to the urinary tract had been present for from two weeks to twenty years two to six weeks in 5 cases two to six months in 7 cases one to six years in 8 cases thirteen years in 1 case not stated in 10 cases

One case had had hysterectomy done a few weeks before admission following which a vaginal fistula developed The ureter was embedded in a mass of scar tissue and the fistulous tract formed a very tortuous channel through this scar tissue

Another case had been delivered six weeks previous to admission to our wards a craniotomy of the fetus having been necessary because of hydrocephalus There had been separation of the symphysis and almost complete anuria for four days postpartum

Another case developed chills and fever with pain in the kidney region two days after delivery

One case had urinary symptoms (pain in right side radiating to the epigastrium and right leg with attacks of nocturia dysuria and frequency at intervals) for one year and had an abscess of the right loin develop on the day before admission

One case had been operated upon for a renal calculus twenty years previously (at the age of twenty)

One case had been operated upon for an infected sacculated cyst of the kidney six months before admission with a persistent sinus through which pus and urine were discharged Two weeks before admission fever and pain in the loin had developed

One case gave a history of a boil over the sacrum two years before admission which had been diagnosed as a gumma The patient received antiluetic treatment Four months before admission a sinus formed over the right sacro iliac joint Bismuth subcarbonate injected into this sinus found its way quickly into the bladder very little remaining in the sinus At operation the sinus was traced to the neighborhood of the kidney but the exact junction with the urinary tract was not found

**Cystoscopic Findings.**—The bladder was the seat of cystitis in 17 cases, there was a marked ulcerative cystitis in 1 case, edema about the ureteral orifice of the affected side in 4 cases, the orifice was of the "golf hole" type in 2 cases

The function of the affected kidney, as measured by the appearance time of phenolsulphonephthalein, administered intra-



Fig 356 —Pyonephrosis. Large shadow represents irregular kidney pelvis with no calices. Smaller shadows are abscess cavities scattered throughout renal pelvis.

muscularly was nil in twenty to thirty minutes in 15 cases, delayed (twelve to fifteen minutes) in 2 cases, normal in 5 cases. Pure pus and no urine was obtained in 5 cases.

**x-Ray Findings.**—A definite stricture of the ureter with marked dilatation above it was demonstrated in 6 cases, with

a dilated kidney pelvis also in 4 cases. Abscess cavities were demonstrated by the sodium iodid injection in 5 cases, tuberculosis was suspected from the pyelogram in 1 case but there was absence of the tubercle bacillus in the urine, the guinea pig inoculation was negative, and no tuberculous tissue changes were found by the pathologist. Tumor was suspected in 2 cases, and very slightly suggested by the atypical filling of the kidney pelvis in 2 cases.

**Pathologic Findings**—These varied from a marked hydro-nephrosis with chronic pyelonephritis to abscess with no kidney tissue remaining. One case showed an anemic infarct and 1 case multiple infarcts, in addition to the infectious process. One case showed advanced pyelonephritis with a small area of tuberculosis (Fig. 356).

### TUBERCULOSIS

Of the 24 cases in this group 14 occurred in males and 10 in females. The majority occurred between the ages of twenty one and forty (15 cases), with 3 cases below twenty, 4 between forty-one and fifty, and 2 cases over fifty. There were two deaths—a mortality of 8.33 per cent.

Symptoms had been present from two weeks to four years. In 11 cases they had been present from one to nine months, in 8 cases, from twelve to eighteen months. The symptoms, in order of frequency of occurrence were: Frequency of urination in 14 cases, hematuria in 11 cases, nocturia, dysuria, and lumbar pain in 10 cases, suprapubic pain in 6 cases, gross pyuria in 5 cases, chills and fever in 3 cases, enuresis and loss of weight in 1 case. In no case was the hematuria painless it being accompanied by either frequency, nocturia, dysuria, lumbar pain, suprapubic pain or by some combination of these symptoms.

Two patients had had epididymectomy for tuberculous involvement eight months and six weeks previously respectively, one had had pleurisy eight years previously, one had had a hip in a plaster cast at the age of four (thirty two years previously) one had had influenza eight months previously and had been in poor health since, one had had an abscess in the

lumbar region three months ago, resulting in a persistent sinus, one had had a pleurisy eight years previously, had been tapped, and in excellent health since

Examination disclosed involvement of the lungs in 3 cases, of both epididymi in 1 case, of the prostate in 1 case. There was tenderness in the kidney region in 2 cases, a palpable mass in the kidney region in 1 case, a palpable kidney in 2 cases

Cystoscopy revealed pathologic changes in the bladder, varying from edema about the ureteral orifice to marked general



Fig 357 —Renal tuberculosis

cystitis in 22 of the cases. Ulceration was present in 6 cases and general cystitis alone in 11 of the cases. It was impossible to catheterize the ureter on the affected side in 4 cases

Tubercle bacilli were found in the urine on direct examination in 15 cases. by guinea pig inoculation alone in 2 additional cases. the guinea pig inoculation was negative in 2 cases

The diagnosis, based on the pyelogram and ureterogram alone, was made in five instances. In 12 cases the x ray diagnosis

was hydronephrosis stricture of the ureter with hydro ureter, enlarged kidney renal and ureteral calculi. In the remaining cases the pictures were apparently normal.

At operation the kidney was noted as enlarged in 8 cases, marked adhesions found in 4 cases requiring a subcapsular nephrectomy in 1 case the ureter grossly involved in 11 cases.

The pathologic findings varied from superficial lesions in the kidney pelvis to total destruction of the kidney tissue.

One death was in a patient of fifty who died on the ninth day following operation from acute cardiac dilatation. The other was a patient of forty seven who had a stormy convalescence developed erysipelas and died on the ninth day (Fig. 357).

### CALCULUS PYONEPHROSIS

There were 29 of these cases with one death a mortality of 3.44 per cent. The youngest patient was twenty three and the oldest was sixty four. They were divided into decades as follows:

| Decade  | Cases |
|---------|-------|
| Third   | 8     |
| Fourth  | 10    |
| Fifth   |       |
| Sixth   | 7     |
| Seventh | 2     |

The calculi were unilateral in 27 cases (on the right side in 15 cases on the left in 12 cases) and bilateral in 2 cases. Of the unilateral cases 20 were in the kidney 6 in the ureter and in both kidney and ureter in 1 case. Of the bilateral cases the calculi were in both kidneys in 1 case and in both ureters in 1 case. One case of the unilateral group also had prostatic calculi.

The symptoms presented were Pain in 27 cases urinary disturbances (nocturia frequency dysuria urgency) in 17 cases hematuria in 5 nausea and vomiting in 5 mucoid material in urine as the only symptom in 1 case gross pyuria in 6 cases. These had been present for from one week to fifteen years as follows. One to three weeks in 4 cases two to five months in

5 cases; two to three years in 9 cases; four to six years in 5 cases; eight years in 3 cases; fifteen years in 1 case; not stated in 2 cases.

**Cystoscopic Findings.**—Cystitis, varying from congestion to well-marked inflammation, was present in 14 cases; edema of the ureteral orifice in 6 cases, pure pus exuding from the ureteral orifice in 5 cases. The function, as measured by the appearance time of phenolsulphonephthalein after intramuscular injection, was normal (five to nine minutes) in 2 cases; slightly delayed (ten to twelve minutes) in 4 cases, markedly delayed (fifteen to eighteen minutes) in 4 cases; none in fifteen to thirty minutes in 14 cases; not stated in 5 cases.

The x-ray findings were positive for calculus in all cases.

In 1 case an acid-fast bacillus was found in the urine, but no tuberculous lesion was found in the kidney. The pathologic diagnosis was hydronephrosis, pyelonephrosis, and renal calculus.

The one death was of a patient, age twenty-three, who died twenty-five days after operation. The autopsy revealed the following: Lobar pneumonia, right; atelectasis and interstitial pneumonia, chronic suppurative pleurisy; nephritis; hydronephritis; chronic passive congestion of the liver and spleen.

### NEW GROWTHS

There were 12 of these cases with two deaths, a mortality of 16.66 per cent. Nine were in males and 3 in females. The youngest patient was seventeen and the oldest seventy-six. They were in the following decades:

| Decade  | Cases. |
|---------|--------|
| Second  | 1      |
| Third   | 1      |
| Fourth  | 2      |
| Fifth   | 3      |
| Sixth   | 3      |
| Seventh | 1      |
| Eighth  | 1      |

Hematuria and pain were the outstanding symptoms, the hematuria occurring in 10 cases and the pain in 10 cases. The hematuria was painless in only 2 of the cases. In the 2 cases

left flank and cloudy urine for one year. Examination showed tenderness in the left upper quadrant. x Ray and pyelography showed the right kidney somewhat low and the left portion large. The left half had a markedly dilated pelvis and ureter; the right showed an atypical pelvis with a portion toward the median line; median to the ureter the ureter being tortuous and mildly dilated opposite the fifth lumbar vertebra. At



Fig 360 Hypernephroma

operation on the left portion was found converted into a sac and this portion of the kidney was removed.

The case of unilateral nephritis was in a female aged forty-four who for three days had had marked hematuria with severe sharp pain in the region of the left kidney which radiated along the course of the ureter to the vulva. There had been pain in the kidney region radiating to the groin seven years previously at which time a curettement had given complete relief.

for eight months, when the pain returned, accompanied by slight frequency and urgency Examination showed only ten-

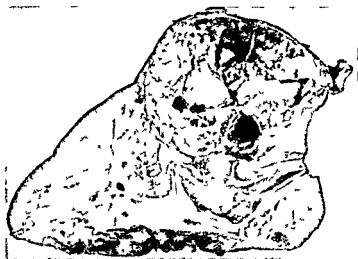


Fig 361 —Papillary adenocarcinoma



Fig 362 —Papillary carcinoma

dermess on fist percussion over the kidney Cystoscopy revealed edema about the left ureteral orifice Pyelography showed both



kidneys low the left kidney large and an atypical filling defect of the left kidney pelvis so that a new growth was suspected. The phenolsulphonaphthalein was eliminated in nine minutes from both kidneys. Operation was done, and the pathologic examination revealed moderately advanced vascular and glomerulonephritis. The patient was free from urinary symptoms seven years later.

The case of infarct was in a male, age thirty five, who gave a history of intermittent hematuria for eight years, and dragging pains in both lower abdominal quadrants. Cystoscopy demonstrated that the blood came from the left kidney.  $\alpha$  Ray and pyelography showed an enlarged left kidney and an atypical pelvis suggestive of tumor. A check on the right kidney showed a pelvis of the same type. Therefore an exploratory operation was done. Nephrotomy disclosed only apparently interstitial nephritis. A section sent to the laboratory was diagnosed as an old healed infarct. Because of continued bleeding a nephrectomy was necessary at the end of a week. The final laboratory diagnosis was chronic and acute pyelonephritis thrombo angitis with old and recent infection (Figs 358 362).

## OPEN REDUCTION IN THE TREATMENT OF FRACTURES

JAMES B. GIVEN, JR

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WE should like to present some of the main issues in deciding the indications for open operation in the treatment of fractures of long bones

The open reduction of fractures has suffered the same fate as many other surgical procedures namely, to be at one time too highly exploited and too frequently performed, and subsequently, too often and at times unjustly condemned. In the early part of this century open operation was widely practiced, stimulated to a great extent, both abroad and in this country, by the development and perfection of the aseptic technic of Sir Arbuthnot Lane. At that time open operation was, indeed too frequently performed. The use of retentive apparatus in or around the bones was the usual procedure when open operation was done. As closer follow up became the rule and end results were studied, it became evident that open operation was a procedure not to be lightly entertained or undertaken, because of its morbidity. More than this, it was realized that the use of apparatus requiring entrance of the medulla or trauma to the cortex, added to the possibility of such morbidity. Following this knowledge which took some years to crystallize, the pendulum swung to the opposite extreme. Open operation came into disrepute a position which it still to some extent, occupies.

The exact anatomic replacement of separated bone fragments, as demonstrated by radiographic evidence, was at one time the foremost criterion of satisfactory treatment of a fracture. In recent years the value of function and the desirability of a satisfactory physiologic result have become more and more appreciated. Many cases which according to x ray examination

are not perfectly reduced anatomically (and this is particularly true in children) we know from our experience will get satisfactory cosmetic and functional results. This knowledge has also served to prompt those interested in the treatment of fractures to be more conservative in the matter of open reduction than they have been in the past. There remain however, in our opinion some definite situations for which open operation may be practised to advantage. We have had in our fracture work in the past year examples of all these abnormal conditions which serve to illustrate that open reduction is at times not only justifiable but imperative. An idea of the frequency of operation may be obtained from the fact that in the course of treatment of 149 consecutive fracture cases of various bones open operation was practised eleven times in one year. The cases fall naturally into four groups

- I Cases of compound fracture
- II Cases of malunion
- III Interposition of soft parts
- IV Other anatomic causes

In the matter of compound fracture the question of operation needs little debate. Debridement is almost universally practised today and the reapposition of bony fragments at that time is usual. Recent literature has brought out considerable controversy in regard to exactly how much should be done to the bone ends in view of the potential infection which exists. Practice in this regard varies and it seems to us that it must vary. For this there are several reasons. The technic of some men and institutions is infinitely better than others in handling these cases. The procedure in every case also must be based on a well considered judgment of the amount of contamination, the severity of the trauma and the period of incubation in its relation to the potential infection. The disposition of comminuted fragments has also of late been subjected to considerable discussion. Many have advised leaving untouched all fragments with any possible viability, others have united these

with chromic sutures. Still others have removed them. Again it would seem that each individual case must be decided on its own merits. On general principles and as sound surgical practice it seems almost obvious that, if possibly avoidable, no internal retentive apparatus should be employed in compounded lesions.

By far the greatest number of cases of open operation comes under the heading of non union or malunion. Open operation is primarily employed here as necessary in restoring adequate function. These cases are happily growing less thanks to the excellent work of the Committee on Fractures of the American College of Surgeons, which has done much not only to standardize fracture treatment but also to stimulate more interest in fractures and to improve the quality of work done throughout the country. Nevertheless, in some instances and sometimes for unaccountable reasons, malunion or non union occurs. We encountered 6 of these cases in the series mentioned. Four of them were about the elbow joint. Three of these were old fractures of the lower end of the humerus with posterior dislocation of the elbow joint. Function was badly limited in all of them, and open operation was the only possible means of obtaining satisfactory arm function. Another was an excision of the head of the radius which because of malunion caused limitation of motion. The other 2 cases were of forearm fractures both with malunion and both obtaining satisfactory function after open operation and adequate reduction. No internal retentive apparatus was used in either case. These are cases, however, *which call for the utmost in judgment regarding the amount of surgery required and the method to be employed*. Internal retentive apparatus is also most frequently used in these cases. The choice of the type of apparatus necessary must also be determined by the individual case each one having its own particular indications and uses and each in its turn serving its purpose well when used in accordance with its indications.

Despite the many and varied forms of closed reduction and the numerous means of traction which have been devised there are some cases in which interposition of tissues between the

fractured fragments makes reduction impossible. Most commonly this interposed tissue is some soft part. The frequency of this complication is increased relatively by the length of time which the lesion has existed before any, or at least adequate, attempts at closed reduction have been practised. Because of the multiplicity of muscles and their bony attachments the shaft of the femur is the most common offender in this group. Other bones will occasionally fall in this class, due



Fig. 363 —Fracture of shaft of femur with muscle interposition

usually to an unusual trauma or type of violence resulting in a fracture at an unusual site or of an uncommon variety. This patient represents a fractured femur irreducible because of muscle interposition. The condition of the bone after repeated attempts at closed reduction is shown in the radiograph (Fig. 363). Open operation was performed, and, after freeing the bone ends, they were held in position by a Lane plate. The condition after operation is shown in the radiograph (Fig. 364). The plate was removed four weeks after it was inserted. The

screw-holes are seen in the radiograph. As you see, clinically, the patient has a large, strong callus and a useful leg without shortening. It is our practice to remove all Lane plates before the patients are discharged from the hospital. We feel that after sufficient callus has been formed the plate no longer serves any purpose, and is always a potential source of trouble for the future as a foreign-body irritant. We have seen plates removed as late as sixteen years after their insertion because of

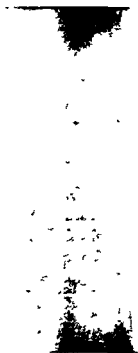


Fig. 364—Same as Fig. 363 after open operation, application of Lane plate, and subsequent removal of plate

chronic bone infection occurring years after the primary operation. We, therefore, consider it good practice to remove them after their purpose has been served.

The next patient presented is an unusual example of interposition of tissue with closed reduction impossible. The lesion was a comminuted fracture of the clavicle at the junction of the middle and outer thirds. The radiograph (Fig. 365) shows the condition as we first saw it. You will observe this loose

bony fragment, approximately 1 inch in length and  $\frac{1}{4}$  inch in diameter, displaced at right angles to the two main fragments. Repeated attempts at closed reduction resulted only in sliding of the main fragments on either side of the loose fragment, making adequate reduction impossible. Because of this and the danger to the large brachial structures from the proximity of the sharp end of the loose fragment, after unsatisfactory attempts at closed reduction, open operation was performed. The loose fragment was removed and the two main fragments united with chromic catgut placed through drilled holes. The radiograph (Fig. 366)



Fig. 365 —Fracture of clavicle with loose fragment preventing closed reduction

shows the condition after operation. You will see that the patient has complete function of the arm and shoulder girdle with very slight shortening of the clavicular length, in no way compromising the free use of it. It is unusual, however, that bony interposition of a loose fragment is such as to interfere with adequate reduction or more important, the probability of satisfactory union. As a general rule, the use of internal retentive apparatus is unnecessary. The reason for this is obvious. Once the interposed tissue is removed from between the fractured bone ends, as a rule adequate reduction can be obtained and maintained

without internal fixation. Here again, however, the use of internal splintage and the nature of it is dependent on the character of the condition found at operation and its accompanying complications, if any exist.

The last group, in which we include those due to anatomical causes, is by far the most infrequent. There exist, however, certain sites in some bones where the conflicting pull of muscle attachments tend to separate the fragment ends so that apposition by external means is practically impossible. This situation existed in the patient you see here and is illustrated by the



Fig. 366—Same as Fig 365 after open operation, removal of fragment, and suture of bone ends with chromic catgut

radiograph (Fig. 367). Closed reduction was impossible; open reduction was therefore performed. The anatomical result is demonstrated by the radiograph (Fig. 368) and the functional result by the patient himself. He has, as you see, perfect function of his wrist, forearm, and elbow. While this type of case is rather uncommon, it does occur, and usually, unless open operation is done, the case becomes one of those under Group II—that of malunion.

We feel, from these few cases shown to you, taken at random from an unchosen consecutive group of cases treated in this hospital, that.



1 There is still a definite field defined by positive indications for open reduction in the treatment of fractures

2 Open reduction should be avoided wherever it is possible to acquire a good functional result without it



Fig 367—Fracture of forearm irreducible because of conflicting muscle pull



Fig 368—Same as Fig 367 after open operation and adequate reduction

3 Internal splinting should be avoided whenever possible, but with proper indications and correct technic may be utilized to advantage

## THE SURGICAL ASPECTS OF EMBOLISM

FROM a surgical point of view the consideration of embolism may be divided into two groups:

- I. Those cases in which embolism occurs as a postoperative complication, and
- II. Those cases in which surgical interference is necessary as a result of an already existing embolic process.

Naturally these two groups occasionally overlap, since a postoperative embolus may be amenable to surgery, although this is unfortunately the exception rather than the rule.

**Group I.**—Postoperative embolus is one of the most dreaded surgical complications and one that is still much of a mystery as far as clinical knowledge of its causation is concerned. We speak now not of the patient with a cardiac lesion or other pre-existing source of emboli, but of the apparently healthy surgical risk whose postoperative course is suddenly terminated by embolus.

**Type of Operation.**—It is commonly agreed that most postoperative emboli arise from a venous thrombosis. It is also generally accepted that the largest percentage of postoperative thrombi arise in the iliac or femoral veins or their tributaries. Nevertheless, this is not always the case, and a review of histories shows that postoperative emboli have occurred following almost every type of operation, from simple hernioplasties and appendicectomies to the most major type of surgery. There have been 18 cases of postoperative embolus on the Surgical Division of The Brooklyn Hospital in the past five years. Three of these have been cerebral. The remaining 15, pulmonary. The mortality in cerebral embolism has been 100 per cent., while only 2 of the 15 cases of pulmonary embolus survived. The toll which postoperative embolus exacts is readily seen from these figures. The types of operations in which emboli occur are as follows:

|  | Cases |
|--|-------|
| Radium implantation                          | 1     |
| Excision of omentum and freeing of adhesions | 1     |
| Hernioplasty                                 | 1     |
| Appendicectomy                               | 2     |
| Drainage of appendiceal abscess              | 1     |
| Ectopic gestation                            | 1     |
| Exploratory laparotomy                       | 1     |
| Prostatectomy                                | 1     |
| Hysterectomy                                 | 3     |
| Mastectomy                                   | 1     |
| Gastroenterostomy                            | 1     |
| Cholecystectomy                              | 4     |

The factors which predispose the pelvic veins to thrombosis are their size the pressure on the common iliacs by their accompanying arteries the proximity of the femoral veins to the inguinal ligaments and the possibility of stasis because of incompetent valve action associated with posture. Thrombosis of the saphenous vein rarely results in embolus probably because it is usually promptly recognized and appropriately treated.

The frequency of thrombus formation at these sites accounts for the predominance of embolism following operations on the pelvic organs notably hysterectomy. Breast cases are followed by embolism resulting from axillary thrombosis due usually to trauma suffered by the axillary vein during axillary dissection.

Another source of embolism is found in septic surgery and we have this complication following drainage of an appendiceal abscess or simple appendicectomy where the meso appendix has become thrombosed in acute appendicitis by septic material. The same thing occurs in acute cholecystitis.

Another source of septic embolus is the amputation of a septic extremity. Some surgeons feel that preliminary ligation of the venous system above the site of amputation should be practised before manipulation of any kind is done on the affected extremity namely the elevation of the extremity for preparation and draping or the application of a tourniquet.

Fat emboli may occur as a postoperative accident and are, as a rule sequelæ of bone operations.

**Type of Anesthesia**—It was formerly believed particularly

in pulmonary embolus, that a general anesthetic, especially ether, was an important factor in this condition. Emboli are not infrequently found following local and regional anesthesia, however. With the increased frequency of use of gas oxygen and ethylene anesthesia one would expect a decreased number of embolic accidents if ether were a prime causative factor, but a review of the literature and statistical comparison seem not to warrant this conclusion.

Postoperative emboli, resulting from thrombosis in the cardiac auricles or from valvular vegetations, also occur. These are not considered here at length, because the conditions are medical in character and not necessarily amenable to surgical procedure.

In considering the question of postoperative pulmonary embolus we assume that frequently many small emboli are broken off into the blood stream, which are so minute that they cause no symptoms whatever, or only slight transient ones. This, we believe, is because it seems to us improbable that a single clot should be liberated and also because many cases of multiple embolic showers are not infrequent. Other emboli are of such size as to cause localized infarction only, with resultant pneumonia, gangrene or lung abscess while still larger ones may cause immediate complete occlusion of the pulmonary artery.

Treatment of postoperative embolus is naturally

First—Prophylactic

Second—Restorative

Prophylaxis concerns itself first of all with the general condition of the operative subject—a condition which we all know, but at times neglect, namely, a thorough work up from a cardiovascular point of view, the restoration of adequate body fluids if they be depleted, the elimination of all foci of infection and the use of every precaution possible to make the patient a good surgical risk.

The next important part of the prophylaxis is the operative technic, and this we feel cannot be too strongly emphasized. Traumatism of the tissues is from every point of view, to be avoided. Gentle handling not only of viscera, but of all tissues, cannot be overemphasized. Sharp dissection near large venous

radicles is to be preferred to blunt dissection. Sponging and packing with laparotomy pads should not be done carelessly or with a heavy hand. Retractors should be placed and handled with respect. Clamping of vessels should be limited to the vessels themselves and not include surrounding fatty or other tissue. Mass ligatures are to be condemned, and prolonged exposure and operative procedure is naturally to be avoided if possible.

Postoperative prophylaxis includes the upkeep of body fluids, cardiac treatment if indicated, avoidance of tight dressings (such as too cumbersome abdominal dressings or a hip spica too tightly applied, compressing the femoral vein) and avoiding an unusual effort or strain.

The active treatment brings us to Group II—those cases in which surgical interference is indicated to relieve a condition caused by embolus. In pulmonary embolus the Trendelenburg operation for occlusion of the pulmonary artery was devised by Trendelenburg, because he found that in 50 per cent of pulmonary emboli only one branch of the pulmonary artery was involved and he believed that prompt embolectomy would be a life saving procedure. The operation is a difficult one, however, since only forty five seconds may be consumed from the occlusion of the vessel by an artery clamp to the removal of the clot and repair. It is rarely practical, although successful cases have been reported.

A more satisfactory field for embolectomy is found, however, in cases of emboli affecting the extremities, resulting, as a rule, not from a surgical procedure, but from cases of cardiac disease or some septic process such as pneumonia.

The most usual sites of embolic lodgment are at vessel divisions. Femoral occlusion is more common than brachial, and more likely to result in gangrene because of the lesser collateral circulation. The diagnosis is readily made by the history of sudden pain, pallor of the extremity, loss of pulsation distal to the embolic process, and the knowledge that the patient has the appropriate pathologic background for such an accident.

Early operation is, of course, essential. The earlier the

embolectomy, the better the progress. Embolectomy is probably never successful when done twenty four hours after the lodgment of the embolus. This figure is obtained from a review of reported successful cases. A much shorter time is the rule for a hopeful outcome. Local anesthesia is preferable since these cases are usually bad risks, and the operation lends itself readily to the use of that type of anesthesia.

The operation consists of an arteriotomy done between arterial clamps, and removal of the embolus. It has been found necessary, at times to make two arterial openings above and below the embolus and to lavage the vessel intima with sodium citrate solution when the clot has been broken up in attempted removal. Following removal of the clot the arteriotomy is repaired in the usual manner and the extremity treated with the usual supportive measures. Here again traumatism is to be avoided, not only from an operative point of view, but also because of the danger of dislodging fragments to form new emboli.

Where embolus has been lodged in an extremity and so much time has elapsed that embolectomy is considered impossible or unwise, amputation is, of necessity, the surgical procedure indicated.



## OSTEITIS DEFORMANS

EDWIN J. GRACE

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OSTEITIS deformans or Paget's disease, was first described in 1877 by Sir James Paget and since then very little information has been added to the literature regarding this uncommon bone entity

DaCosta states that only 158 cases have been reported and of this number some undoubtedly represented other bone maladies because of the relatively crude diagnostic equipment existing for three or four decades following Paget's original description

Osler states that at the Johns Hopkins Hospital there were 2 cases of the generalized form of this disease in 20,000 admissions. We have had at The Brooklyn Hospital during the last ten years 69,673 admissions and in these there were 4 cases of Paget's disease. In the x-ray department this disease is occasionally diagnosed while investigating for other lesions

The cause of the disease is unknown, but lues, arteriosclerosis and endocrine disturbances have been mentioned as possible underlying causative factors in the production of this perversion of bone physiology

Symptoms in the very early cases are generally absent, and the diagnosis is made occasionally while investigating for some other condition. It is most frequently found in the fifth or sixth decade of life and manifests itself by pain in the affected part resembling rheumatic arthritis but it does not show any tendency to involve other joints or produce the red inflammatory state characteristic of that disease. The pain in Paget's disease is generally along the shaft of the bone. In marked cases the epiphysis becomes greatly enlarged and the legs become bowed and the stature of the individual is shortened, in one of the cases to be cited below there was a definite curvature of the



spine due to the forward bowing of one leg. The bowing is quite characteristic in the disease being anterolateral and is due to the pathology which disturbs the cortex.

The microphotograph here shown (Fig. 369) illustrates very clearly the typical features of the disease, namely the new bone formation, bone destruction, and the production of fibrous connective tissue. The bone disturbances, namely the degeneration and regeneration, go on simultaneously. For Paget's

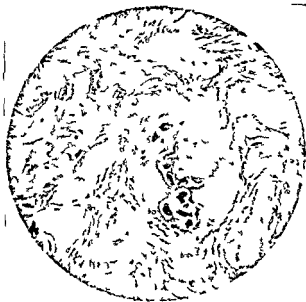


Fig. 369 —This section shows the characteristic changes seen in Paget's disease of bone, namely the invasion of the medullary substance and replacement of bone marrow with fibrous connective tissue, the formation of new bone, and the dissolution of old bone going on simultaneously.

In this disease there is no specific treatment except the use of palliative measures, such as diathermy, ultraviolet light, and other physiological therapeutic agents. These seem to relieve the patients of their distressing pain and make it possible for them to continue at work. The disease, of course, is steadily, though in most instances slowly, progressive. In one patient the use of ultraviolet light seemed to result in great relief of pain.

In presenting the 4 following cases we have, for the sake of brevity, confined the history only to the positive findings.

Case I.—F. C., male, white, aged fifty-one. Patient admitted to the hospital for bowing of right leg and discharging ear. Of

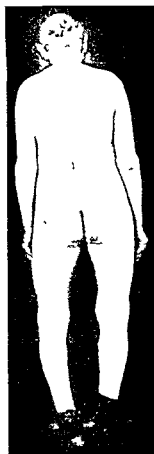


Fig 370 —Case of Paget's disease with anterolateral bowing of left tibia and spinal curvature

late he has had to wear a much larger hat, and now finds that he cannot extend his knee completely. For two years previous to admission he had noticed that his hands were getting larger and motion was limited. This patient has had a series of fractures—eight in number, they all united in a normal manner except the clavicle, which had a very prominent angulation.

The right tibia has a forward and outward bowing with some edema of the tissues over it

$\alpha$  Ray studies revealed an osteoporotic condition in all skeleton bones marked thickening along the shafts of long bones and slight bowing of the right tibia Sella turcica enlarged and posterior clinoid process is very indefinite

The clinical signs and  $\alpha$  ray studies resulted in a diagnosis of osteitis deformans

**Case II—T McC** white male aged fifty This patient was admitted to the hospital complaining of backache of eight

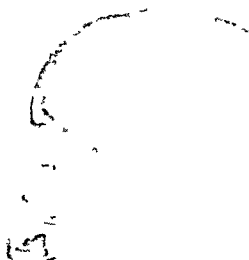


Fig 31 Characteristic skull changes showing thickening and osteoporosis weeks duration At present the pain is accentuated by movement and is often referred to the right groin

This patient was sent to the Urologic Clinic on admission and a stricture of the right ureter diagnosed While  $\alpha$  ray studies were being made on the urinary tract the bone changes in the vertebrae suggestive of Paget's disease were found and

on further study, the disease was confirmed in other bones. This patient had no symptoms other than those of ureteral origin in spite of the marked bone change.

*x-Ray skeletal studies showed considerable bowing of the long bones, change in the density, with thickening of the cortex and periosteal irregularity*

**Case III.**—M G, female, aged forty-five. Admitted to the hospital complaining of swelling in the left leg For the past

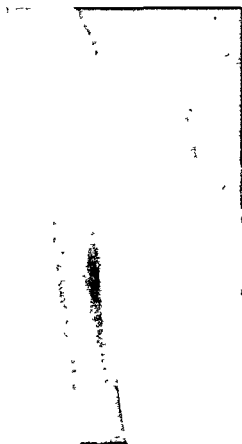


Fig 372 —Showing marked bone changes in pelvic bones and upper end of femur

two or three years patient has noticed that the left leg has been increasing in size, but has never had any trouble with it until seven months ago, when she fell and injured her knee Since

then she has had continuous shooting pains extending up and down the leg. She has not had any fever or any other constitutional symptoms, the pain is worse when she stands, and there is some difficulty in flexing the knee.

*x* Ray study. Bones of the skull, both femora, tibiae and pelvis show marked striated texture tending to obliterate the medullary canal, some normal bone occasionally seen. Tibiae bowed forward. Surface of bones irregular. Diagnosis: Osteitis deformans.

Case IV—W. H. aged fifty two, mechanic, was admitted to the Surgical Clinic on January 16, 1926 with the following

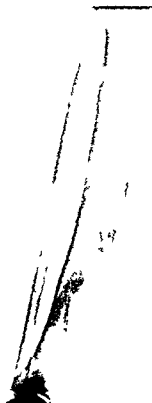


Fig. 373—Showing characteristic bone changes in tibia with marked antero-lateral bowing.

complaint On reporting for work, six months previous to date of admission, he started to bend over, when he was suddenly seized with a severe pain below left knee He thought it was a slight sprain and tried to continue his work, but was compelled to go home because of the pain, which eventually incapacitated him From this period, namely, July 7, 1925 to January 15, 1926 this pain has continued, so that he has been compelled to stop work entirely During this time he has visited numerous institutions about the city and tried countless remedies Pain and disability at all times confined itself entirely to his left knee, occasionally radiating downward from this point to the ankle, but has never shown any tendency to involve other parts of the body

*Physical Examination*—Essentially negative, except for a very unusual bowing of the left leg below the knee, this extends very definitely the entire length of the tibia The bowing of the bone is anterolateral There is no localized point of tenderness There is no swelling in the joints

All laboratory investigations were negative The blood calcium showed 11.7 mg per 100 c c of blood, this is within normal limits

x-Ray studies showed changes in the bone densities of the skull, vertebræ, pelvis, femur, and tibia, with some thickening of the cortex



## MYOSITIS OSSIFICANS (LOCALIZED) AND TENOLITH OF THE QUADRICEPS TENDON

G H V HUNTER

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**Myositis Ossificans (Localized).**—This boy, eight years of age, presented himself at our Orthopedic Clinic with a history of having suffered an injury to the left elbow five months previous to admission

The following is the result of our study of the case

The boy complained of inability to flex or extend the left elbow, it being fixed at an angle of 120 degrees The medical history was negative He had had the usual childhood diseases Physical examination negative except for the condition mentioned above

Von Pirquet—Negative

Wassermann—Negative

x Ray examination before operation showed "a broad band of bony substance in front of the elbow joint extending from the coronoid process of the ulna, upward and forward, a distance of 2 inches" (Figs 374, 375)

A diagnosis of localized myositis ossificans was made and an operation advised Through a 4-inch incision the supinator longus was pulled aside, and the mass of bone identified, freed, and removed It was attached to the ulna deep down in front of the joint and it was impossible to remove the mass completely, a small fragment about 1 cm square being left It was then possible to fully extend and flex the elbow The wound was closed in layers, and healed by primary intention

Pathologic report was "section of normal bone 4 x 1 x 1 cm "

At the end of ten days the patient was sent to the Physiotherapy Department where he received baking, massage, and



diathermy At the end of one month full extension and flexion could be accomplished without any pain and the child now has full use of the arm

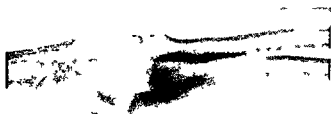


Fig 374 —Anteroposterior view of joint showing portion of bony mass remaining after six months

An *x*-ray six months after operation shows no further bone proliferation (Figs 376 377)

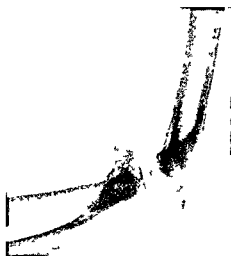


Fig 375 —Lateral view of joint showing portion of bony mass remaining No further proliferation shown after six months

A review of the literature shows the following classification of this condition



Fig 376 —Anteroposterior view of elbow showing portion of outgrowth attached to ulna



Fig 377 —Lateral view of elbow showing bony outgrowth attached to ulna

1 Myositis ossificans progressiva, in which bony outgrowths may occur in any of the muscles of the body

2 Myositis ossificans circumscripta, in which bone is deposited in one or more muscles as a result of repeated slight trauma, frequently found in the adductor muscles of the thigh in horse back riders



Fig 378—Lateral view of knee joint showing tenolth above patella. Note also lipping of patella and tibia with apparently a loose body posterior to femur

3 Myositis ossificans localized To this class we feel sure this case belongs It is caused by severe trauma and its most frequent sites are the quadriceps and the region of the elbow Pathology It is a periosteal transplant caused by a rupture of periosteum with a liberation of osteoblasts

Tenolth of the Quadriceps Tendon—This patient is a widow, sixty six years of age, who came to us because of con

siderable pain in the right knee This had existed for six months, and was aggravated by walking

*Previous History*—Has had several attacks of arthritis, the last about ten years ago both knees being attacked Was never acutely ill at these times being rarely confined to bed over a few days

*Physical Examination*—Negative, except for the local lesion There was inability to fully flex or extend the right knee, and a mass was palpable in the quadriceps just above the patella

*x Ray examination* shows two distinct masses, one in muscle above the patella, the other behind the femur (Fig 378)

*Diagnosis*—Tenolith of the quadriceps tendon

An operation was advised, and was performed the following day

*Procedure*—A 4 inch incision on the antero external surface of right knee, just above the patella The incision was carried down through fascia to the junction of the muscular and tendinous part of the quadriceps muscle The tenolith could now be felt freely movable and surrounded by a sac The latter was incised and the tenolith shelled out easily A small amount of mucilaginous substance escaped It was possible to pass a finger in the sac down to the patella, to which the tenolith may have been attached

The wound was closed in layers and healed by primary intention

*Pathologic Report of Specimen*—A coral like white bony excrescence 4 x 2 x 1 cm

*Pathology*—From the *x ray* appearance of the joint shadows, in addition to lipping and spur formation, we are of the opinion that this tenolith was formed during the course of the arthritic attacks years ago, being an excrescence from the upper margin of the patella and that later on this was broken off from the parent bone

TABLE 2

| Case No. | Age | Breast lesion first noted | Date of mastectomy | Pathologic report  | Date bone metastasis noted | Clinical symptom          | Bones involved                       | Time between breast lesion and bone metastasis | Clinical note                                |
|----------|-----|---------------------------|--------------------|--------------------|----------------------------|---------------------------|--------------------------------------|--|--|
| 1-A A    | 43  | Fel 1922                  | Oct 20 1922        | Scur carcinoma     | Aug 1925                   | Every bone in body sore   | Clavicle                             | 3 yrs 6 mos                                    | Axil node time of operation                  |
| 2-A B    | 35  |                           | Sept 1922          |                    | Apr 1923                   | Pain in leg and back      | R leg 1 lumbar vert                  | 7 mos  |  |
| 3-M B    | 44  |                           | 1917               |                    | Aug 1924                   | Pain left leg             | Dor lumbar vert pelvis femurs        | 7 yrs  | Axil gland x Ray therapy after mastectomy    |
| 4-C B    | 51  | Dec 1924                  | Jan 1925           | Duct carcin        | Feb 1926                   | Pain hips and knees       | Twelfth dor vert Rt femur            | 1 yr 2 mos                                     | Axil glands                                  |
| 5-A C    | 38  | Oct 1925                  | May 1926           | Early sc carcinoma | Aug 1926                   | Pain in back and side     | Seventh dor vert                     | 10 mos   | No axil nodes 3 mos pregnant when lump noted |
| 6-E F    | 68  |                           |                    |                    | June 1926                  | Pain in back              | Fifth sixth seventh dor vert         |  | Axil nodes. Case inoperable                  |
| 7-E I    | 41  |                           | 1918               |                    | Sept 1923                  | Pain rt hip weakness      | Pelvic bones femurs                  | 5 yrs  | Lost 15 pounds a few July                    |
| 8-F G    | 42  | 1918                      | Oct 1922           | Scur carcin        | Oct 1922                   | Pain in buttocks Weakness | Dor leg vert Pelvis femurs           | 4 yrs  | Axil nodes                                   |
| 9-M H    | 53  | 1916                      |                    |                    | Sept 1926                  | Pain in muscles           | Dor lum vert Pelvis rib scapular fem | 10 yrs   | Mass lanced 4 5 yrs ago x Ray therapy        |
| 10-Q H   | 41  |                           | 1921               | Carcinoma          | Dec 1925                   | Pain left hip             | Pelvis                               | 4 yrs  | Fract ilium. x Ray therapy                   |
| 11-N H   | 35  | 1920                      | 1923               | Scur carcin        | Nov 1923                   |                           | Left ilium, femurs                   | 3 yrs  | Axil nodes.                                  |
| 12-B H   | 45  | April 1925                | Mar 1926           | Scur carcin        | Sept 1926                  | Pain on motion            | Dors vert                            | 1 yr 5 mos                                     | Axil nodes                                   |

|         |    |      |          |             |           |  |   |           |   |
|---------|----|------|----------|-------------|-----------|--|---|-----------|---|
| 13 R k. | 32 | 1916 | Aug 1920 | Carcinoma   | Dec 1923  | Pain in lum region                                 | Ribs lum vert<br>Pelvis femurs  | 7 yrs     | Axil nodes  |
| 14-M I  | 53 |      |          |             | Apr 1925  | Pain arms and legs<br>noted 1924                   | Rt femur occip<br>bone  |           | Double mastect<br>Path fract rt fe<br>mur clin diag<br>enceph letharg |
| 15 S M  | 50 | 1923 | Dec 1923 | Scir carcin | Apr 1926  | Pain rt th gh and<br>hip                           | Femurs  | 3 yrs     | No axil nodes met<br>astasis lungs                                    |
| 16 I M  | 47 |      | 1921     |             | Apr 1925  | Tw itch lege d ff<br>walk Lack con<br>trol rt hand | Parietal bones  | 3 1/2 yrs | Autopsy carcin<br>brain and lung                                      |
| 17-S N  | 44 |      | 1911     |             | Aug 1925  | Pa n back rt hip<br>and leg                        | Dors and lum vert   | 14 yrs    |   |
| 18 A P  | 48 | 1921 | Oct 1922 | Med carc n  | Sept 1924 | Pain back  | 1924-Dor vert<br>1925-Vert ribs<br>clav scap rt rad<br>and ulna both<br>fem and tibre | 3 yrs     | No axil nodes x Ray<br>therapy after mas<br>tect                      |
| 19-H P  | 50 |      | Jan 1923 |             | Jan 1923  |  | Scap ribs dors<br>lum vert ilia   |           | Axil nodes  |
| 20-M R  | 52 | 1921 | Feb 1925 | Duct carcin | Apr 1925  | Backache   | Dors lum vert ribs  | 4 yrs     | Axil nodes  |
| 21-M V  | 30 |      | 1921     |             | Oct 1925  | Pain and stiffness<br>neck                         | Fourth fifth and<br>sixth cerv vert   | 4 yrs     |   |

As is well known, breast cancer is the most prone to bone metastasis. Table 2 (pages 878 and 879) gives a brief summary of these cases.

We have often been content in our preoperative work simply to make an x ray study of the lungs in order to determine the presence of metastasis. This would not seem to be a sufficiently thorough examination. In our 21 cases we also examined the lung field of 12 of them, and of these 12, 6 showed metastasis to lung or pleura, so that 6 of that small group showed bone



Fig. 379 — Metastasis in distal portion of right clavicle. Right chest dense throughout.

metastasis without showing the lung lesion. It would seem that at least 4 of our cases had their bone lesion at the time of operation, though that fact had not been investigated.

There is a wide variance in lapse of time between the original lesion and the bone metastasis. It seems to have very little relation to the age of the patient, though 2 of the patients in the youngest group in which carcinoma was found (namely, in the third decade) had the metastasis in less than a year, but

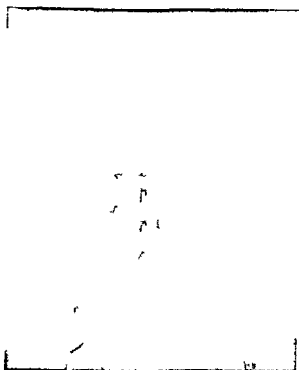


Fig 380—Multiple metastases scattered through lumbar vertebrae and pelvic bones



Fig 381—Multiple metastases scattered through pelvic bones and upper portion of femora





Fig 387 —Metastasis in right femur—intertrochanteric region

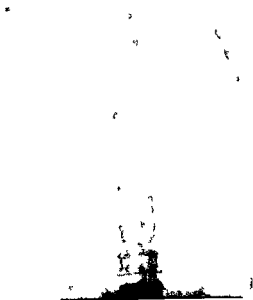


Fig 383 —Metastasis in seventh dorsal vertebra



Fig 384 —Metastases in fifth sixth and seventh dorsal vertebræ



Fig 385 —Metastases in pelvic bones and upper portion of femora

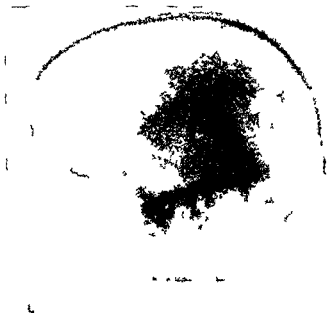


Fig 386 —Metastases to skull bones



Fig 387 —Metastases to upper end of right femur with pathologic fracture

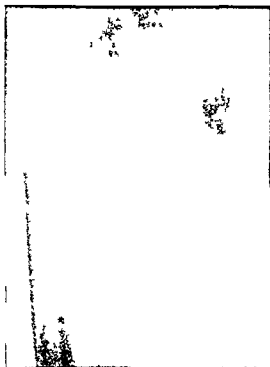


Fig 388 —Metastasis to upper end of right femur



Fig 389 —Metastases to fourth, fifth, and sixth cervical vertebræ

another in that same group went seven years before it was discovered. Our range for all age groups was from seven months to fourteen years with the predominating length of time being from three to five years.

We have found the dorsal vertebræ the most common site for the metastasis (11 patients showing this site of selection) but the lumbar vertebræ pelvic bone and femurs are almost as

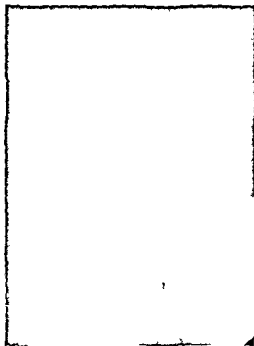


Fig 390 — Lateral view of Fig 389

common being found in 9 or 10 cases. Most of the bones of the body have been represented except those of the hand and foot and generally in each patient the lesion is widely disseminated.

Of the 13 cases seen in this hospital before operation 10 already had axillary glandular enlargement. Of the 3 cases not showing such enlargement the first (Case 5) is now known to have had her bone metastasis at time of operation the second



Fig 391 —Metastases in frontal bone of skull



Fig 392 —Metastases to os calcis



Fig 393 —Metastases to shoulder girdle and to ribs



Fig 394 —Metastases to lumbar vertebræ and to pelvic bones



Fig 395 —Same case as Figs 393 and 394, showing metastases to femora.

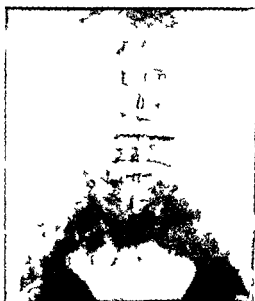


Fig 396 —Metastasis to neck of femur with pathologic fracture





F g 393 —Metastases to shoulder g rdle and to r bs



F g 394 —Metastases to lumbar vertebræ and to pelvic bones

(Case 15) showed bone metastasis three years later, though the patient states she had the pain indicative of metastasis a year earlier, the third (Case 18) also showed bone metastasis three years later, so that, so far as we can demonstrate operation before there are palpable glands is no insurance against metastasis

Our other types of carcinoma with bone metastasis are few in number. It will suffice perhaps, to give a brief summary of the cases of those used as illustrations

**Case I**—T C, female, aged fifty three. Admitted to The Brooklyn Hospital April 24, 1923 complaining of "swelling on forehead." This was noticed one month previously, and was steadily increasing in size, and was painless. It was opened three weeks before admission by a physician who squeezed out a little blood, after which it increased more rapidly. Past history negative. Operation April 24, 1923. Growth lifted off bone, which revealed area of necrosis through both tables.

Pathologic report. Metastatic carcinoma (kidney?).

x Ray of skull April 26, 1923. Metastases found in right parietal, right temporal and in frontal bones.

**Case II**—L B, male, aged sixty. Entered hospital June 15, 1926 with complaint of mass in groin, which he had had for fifteen months following a blow by hand. Was operated upon twelve months ago, since which time symptoms have grown progressively worse. Pain in left thigh and foot, with edema of the lower leg.

Operation June 19, 1926. Biopsy and removal of mass.

Pathologic report. Squamous cell carcinoma of skin.

x Ray of left foot, June 28, 1926, and of the dorsal and lumbar spine and pelvis, July 26, 1926. Marked evidence of metastasis was found in the left os calcis, in several of the vertebrae, and in the pelvic bones.

**Case III**—J L, male, negro, aged fifty-eight. Admitted to hospital March 11, 1924, with complaint of pains in legs for

last year and a half Began with dull, constant ache in back, and gradually grew worse

Past history negative In the physical examination, prostate was found to be irregular, enlarged, in places stony hard, with fixation of the gland

x-Ray study of spine March 12, 1924 Extensive carcinomatous metastasis involving shoulder girdle, ribs, dorsal and lumbar vertebræ, pelvis and both femurs Arteriosclerosis of blood vessels of both thighs

Case IV—M McC, white woman, aged forty-two, entered hospital May 8, 1923, complaining of soreness in left thigh of three weeks' duration Twenty two days before admission patient lost her balance and fell Felt something snap, walked about with aid of crutch for eight days, and then went to bed About two weeks ago, on attempting to rise, felt another "snap" in left thigh, accompanied by great pain The latter has continued x-Ray study of left hip May 8, 1923 Fracture of neck of femur found, and the appearance of the bone suggested new growth which was thought to be sarcoma

Operation July 18, 1923, for diagnostic purposes

Pathologic report Papillary carcinoma metastasis (perhaps ovary)

Case V—M A, white woman, aged seventy five, entered hospital May 27, 1924, complaining of 'lumbago with rheumatism' Fourteen months ago an attack of lumbago which persisted Some months later pain extended to hip and knees, used crutches for one year and has since been confined to chair x-Ray study of lumbar spine May 29, 1924 Here, besides proliferative arthritic changes, the third lumbar vertebra was seen to have discrete spotty areas of rarefaction with partial collapse of the body of that vertebra

The primary lesion was not found in this patient

Case VI—C E, white male, aged sixty three Entered hospital April 7, 1926, complaining of pain in left leg and blood

in urine For past eight weeks severe pain in left leg which is getting worse Starting about seven weeks ago, has been having increasing frequency in urination Now has urgency Burning with urination, and, lately, bright blood in urine Loss of 10 pounds in last year

x-Ray study April 1, 1926, of skeleton Marked increase in density of dorsal and lumbar vertebræ and of pelvis, with loss of normal texture suggesting osteitis deformans In left femur an area of rarefaction, thinning of cortex of bone and some new bone formation, this was thought to be either osteomyelitis or sarcoma

Operation April 24, 1926, on left femur for biopsy

Pathologic report Metastatic scirrhous carcinoma of bone

This patient died April 27, 1926 Autopsy performed, and extensive carcinoma of the bladder was found

Radiographically, we find the metastasis represented as simple areas of absorption or of absorption with bone production There were 21 of the former and 8 of the latter, and in the breast cases both types are represented, 16 with simple absorption and 5 with absorption plus new bone production, which indicates the more characteristic type to be purely absorption As perhaps would be expected, the stimulation of bone growth is seen more often in those cases showing a greater lapse of time between the primary lesion and the bone manifestation, these falling in the three, four, five and seven year periods Our 2 prostatic cases were both of the stimulative type, as was also the bladder case The skin case seemed to show simple absorption This was also true of the 4 undifferentiated cases

### CONCLUSIONS

1 In reviewing our cases of bone metastasis it would seem that carcinoma shows very little design in its attack on bone, both as to location and the time of involvement

2 Bone metastasis is particularly vicious and most frequent in breast cancer, when it may not even be halted by the first line of defense namely, the lymph glands, at least in so far as we can clinically differentiate

3 A more careful study of our cases of breast cancer would demonstrate the early involvement of bone in a considerable percentage of patients who show no lung pleural or intra peritoneal metastasis and who otherwise may seem within the limits of operability By such a study it should be possible to eliminate a certain percentage of useless and unwarranted operations

## A COMPLETE OPERATION FOR CANCER OF THE BREAST

JOHN EDWARD JENNINGS

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AN incomplete operation for cancer of the breast is one that invades malignant tissue during the course of the dissection. This may be recognized as unavoidable before the operation



Fig. 399—Showing lines of skin incisions\* with special reference to axilla

begins, and if that be the case, the operation should be admittedly a palliative one to be performed with proper *x* ray preliminary and secondary treatment with the actual cautery or electric knife

Dissection of cancerous tissue may become inevitable during the course of an operation that it was hoped might result in a radical cure. This does not necessarily mean despair. There are wide variations in the degree of malignancy and sometimes even seemingly hopeless cases miss recurrence. The invasion

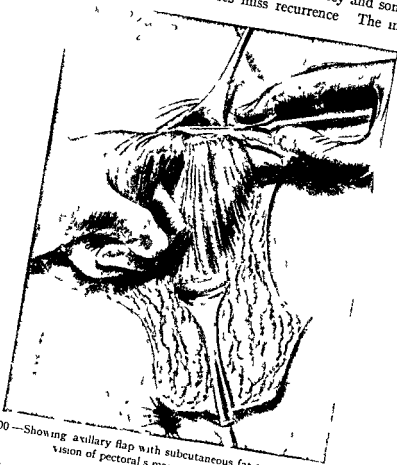


Fig 400—Showing axillary flap with subcutaneous fat turned back and division of pectoralis major near its insertion

of malignant tissue however disseminates the disease, and may remove from an otherwise early case its last chance of arrest. To be complete, an operation for cancer should surround the disease without touching it and should remove it en masse without having seen it.

There are certain areas in the region involved in the radical operation for cancer of the breast that may be called dangerous. These are:

1. The lymphatics high up in the axilla, especially those beneath the pectoralis minor.



Fig. 401—Showing division of pectoralis minor and exposure of axillary vessels

2. The fascia of the chest wall.
3. The skin of the axilla and the lymphatics of the lower chain.

The progress of a scirrhus cancer of the breast maps out these lymphatics by its progressive invasion, and shows to the naked eye a condition that must have been long existent micro-



scopically, the possession by malignant outposts of the area of the lower axilla whose base is the axillary skin. All the standard operations invade this area and seem not only illogical, but, by



Fig 40<sup>3</sup> —Showing dissection of breast muscles and axillary contents en masse from above downward

actual experience, more dangerous than the one I have used for fifteen years

This consists of first a skin incision which completely surrounds the area of early skin dissemination. It includes all the axillary skin widely surrounds the breast and is carried well

down beyond the ensiform cartilage in the midline. The axilla is entered at its outer angle by cutting the tendon of the pectoralis major at its insertion and by freeing the pectoralis minor from the coracoid process. The skin and fat are then encircled



Fig. 403 —Showing dissection completed

by a dissection which recognizes the tendon of the latissimus dorsi surrounds all the contents of the axilla and removes them en bloc with the pectoral muscles and a wide sweep of fascia under the breast itself.

Figures 399-404 will show the procedure

The scar does not remain in the axilla but is carried forward



Fig. 404.—Showing appearance of wound after final suture

in a few weeks if the skin and subcutaneous tissues are lifted from the latissimus dorsi for a distance of 3 to 4 inches

## HYDROCEPHALUS IN INFANCY

THE work of Dandy has done a great deal to clarify our ideas of the pathologic anatomy of congenital and infantile hydrocephalus, and his studies seem to verify previous opinion as to the importance of plastic inflammations of the meninges in producing obstructions to the circulation of the cerebrospinal fluid.

The work of Cushing and his associates has again demonstrated that this fluid circulates and is absorbed over the con-



Fig 405 —Lateral view of normal case showing air in ventricle and peripheral arachnoid

vexities of the hemispheres. In order to reach this area it flows from the choroid plexus, which produces it, through the ventricles, passing out of the foramina of Magendie and Luschka into the arachnoid spaces which cover the surface of the brain. There are certain larger spaces, which are called cisternæ, at the base. Some of the fluid must be absorbed in the lower chamber, but most of it passes up along the crura cerebri through the incisura tentorii and distributes itself with great evenness over the

cerebral hemispheres. It is as if sand in an hour glass in which the upper chamber were larger than the lower after falling



F g 406 —One dilated ventricle. No arachnoid peripheral arachnoid

within the glass passed out of little openings and streamed up again on the outside



F g 407 —Dilated ventricle. No arachnoid spaces

The most obvious region for obstruction is in the narrow neck between the two chambers. This may be as Dandy has

so well described. Either within the isthmus, stenosis of the iter, or, on the outside, arachnoid block at the incisura. It may



Fig 408 — Much dilated ventricle

also occur by sealing over of the foramina of the fourth ventricle, or large areas over the convexities may form a patchy block.



Fig 409 — Much dilated ventricle

which is compensated for by dilatation of neighboring channels. In either event the obstruction is partial in all the cases we are

interested in now. A complete block is seen in acute meningitis and is, unless relieved rapidly, fatal



Fig 410 —Much dilated ventricle

Some seven years ago we began to study these cases by the injection of air into the spinal canal after the slow withdrawal

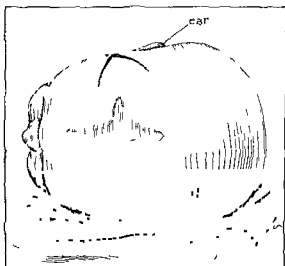


Fig 411 —Corpus callosum section Incision

of the spinal fluid as described by Dandy When as much fluid as can be easily obtained, is withdrawn, having been re-

placed, 10 c.c. at a time, by air, radiographs are taken laterally and anteroposteriorly. In six hours, and in twenty-four hours, the x-ray work is repeated. The disappearance of the air is a good index of the rate of absorption. By this method the extent

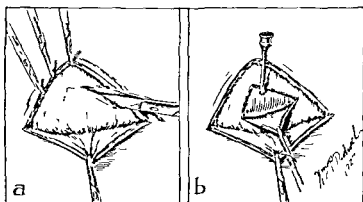


Fig 412 —Corpus callosum section a, Section of infant skull with scissors, b, tapping ventricle before opening dura

of dilatation of the ventricular system and of obliteration or block of the absorbing areas of the arachnoid over the convexities may be mapped out with apparently a fair degree of ac-

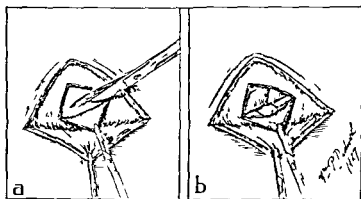


Fig 413 —Corpus callosum section a and b Opening dura

curacy. This procedure will quickly distinguish the site of the obstruction if one exists, and its absence if one does not.

If the air presses and its shadow is seen in the great cisterna in the ventricles and spreads over the cortex regularly outlining



it is a sequence almost entirely avoidable even in wounds inevitably infected. With proper suturing and after care it should rarely occur.

Masson in a study of ventral hernia statistics at the Mayo Clinic in 1922 found that 2.06 per cent of all abdominal operations performed there were for that condition and says that in his opinion a large majority of the patients never come to the surgeon for relief. Most of the patients who came to that clinic had had enough trouble to interfere with their regular work. In the Mayo series of 592 cases only 134 were in cases previously operated upon in the clinic.

It is the custom to blame the occurrence of ventral hernia on sepsis and no doubt this is a most frequent cause especially at present when the exaggeration of an excessively wide wound is adopted in some clinics. It is not however the only cause and may even be considered in the light of an exciting cause in many cases where other factors are predisposing.

The conditions which favor the production of an incisional hernia are those that interfere with satisfactory wound healing and those that add severe strain to soft tissue too soon. They may be enumerated as follows:

- 1 Transverse section of muscles (with unsuccessful repair)
- 2 Section of muscle insertion (insecurely sutured)
- 3 Imperfect closure
- 4 Failure of union (without sepsis) and separation of muscle and fascial layer in cachectic and emaciated patients
- 5 Infection of abdominal wall with necrosis of muscle and fascia
- 6 Extremely wide or prolonged drainage
- 7 Increased intra abdominal tension from vomiting, coughing, distention and strain during lavage
- 8 Extreme restlessness or delirium
- 9 Too early exertion particularly in flabby subjects and in those who are overweight

The paralytic hernias are caused by

- 1 Injuries to the muscular branches of the lumbar nerves at the time of operation

2. By the involvement of the nerves in an infectious process with resulting neuritis or even actual destruction of the nerve by sloughing.

It would seem unnecessary to speak at this time of un-anatomic invasions of the abdominal wall, but cases, in which the lesion is only too evidently due to disregard of the Latin names of Valentine Mott, still continue to appear.

At recurring intervals a transverse section of the rectus abdominis in its upper third is recommended as giving free

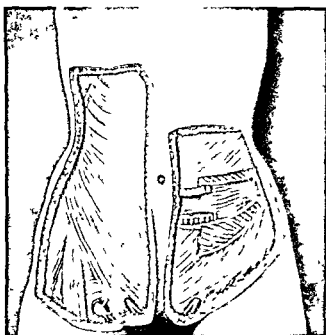


Fig 416 —Muscles of the abdominal wall

access to the subcostal area, and, while this may be often accomplished with good union and a firm abdominal wall, the occasional failure admits of so large and so crippling a hernia, and one which is so difficult to repair, that it should seldom be resorted to and never used in routine

In the earlier days of abdominal section it was the custom to cut directly across the fibers of the internal oblique an inch or so from the iliac spine, after which the wound was liberally drained and many hernias resulted. In correction of this prac-

tice McBurney's gridiron incision was devised but this unfortunately gives a small and often an inadequate exposure and has hence fallen more or less into disuse. The incision of Kammmerer which cuts the anterior rectus sheath, retracts the muscle and opens the peritoneum behind it is satisfactory if no drainage is required and if it be carefully repaired so as to secure the rectus edge to the insertion of the internal oblique.

In the upper abdomen the transverse muscles or their aponeurotic insertions into the linea alba carry most of the cross

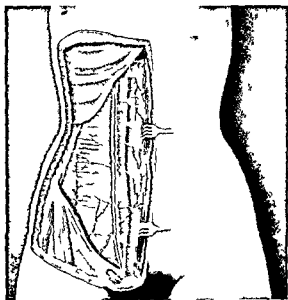


Fig. 417.—Nerve supply of rectus abdominis

strain and if they are inadequately secured a fault will result which will allow the hernia to push its way through the rectus at a later time.

Failure of union without infection occurs rarely, most often in old people and in anemic, nephritic, diabetic or cachectic patients. When it does occur a careful secondary suture should be done as soon as possible. Abdominal wall infection is a most common cause. It should be guarded against by gentle manipulation, protection of the abdominal wall during operation.

careful hemostasis and accurate suture without strangulation. The use of small sizes of catgut and in cases in which peritoneal infection is dealt with the skin and fat should not be sutured whether the abdominal cavity is drained or not.

Too much stress can hardly be laid on the importance of deeply set non absorbable stay sutures in all laparotomies except clean intermuscular incisions. No suture material is as good as silkworm gut for this purpose and this should be well selected. This makes it expensive. A good salmon leader is worth \$5 or more for 9 feet of selected gut. Is a fish worth more than a man? This grade of gut is to be obtained only in the fishing tackle stores but it is worth paying for.

The diagnosis of a ventral hernia does not as a rule present any difficulty save occasionally in a fat subject. It is desirable however, to recognize the condition and if it is not at the time dangerous or annoying to insist on the patient returning at intervals for observation. Here if anywhere in surgery a stitch in time saves nine.

It seems desirable to attempt to make some classification of the various anatomic forms of ventral hernia, and this may be done as follows

- 1 The part of the abdominal wall involved
- 2 The form of the hernia itself

The anatomic varieties of ventral hernia may be grouped as follows

- 1 Median line hernia
- 2 Transrectus hernia
- 3 Semilunar line hernia
- 4 Subcostal transverse
- 5 Intermuscular
- 6 Lumbar
- 7 Irregular or mixed

And according to their form

- 1 Slit hernia
- 2 Broad retraction hernia
- 3 Cribriform hernia
- 4 Pedunculated hernia

5 Sacculated hernia

6 Paralytic hernia

7 Massive

8 Interstitial

(a) Slit hernia in which the opening is narrow and long often at or near the semilunar line

(b) Broad retraction hernia in which a soft scar is slowly spread wider and wider by the pull of the transversalis but in which the bulge is comparatively slight most often in the upper abdomen

(c) Cribriform hernia having small (several) openings piercing the scar tissue always the result of infection frequently annoying sometimes becomes dangerous

(d) Pedunculated hernia with a small opening through which a pear like sac pushes itself dissecting under the skin like an umbilical hernia not common most often in the midline, often dangerous

(e) Sacculated hernia—a development of the pedunculated form with stretching of the ring of a broad retraction hernia low in the abdomen Many adhesions often bands quite likely to become strangulated in which case the mortality is high

(f) The paralytic hernia—broad and flat for the most part and often without adhesions and with no intra abdominal distress Is apt to enlarge and limit the usefulness of the abdominal wall In each case there is to be noted that there is an element of paralysis in many hernias not due to it alone

(g) Massive—well described and defined by McGlannan

(h) Interstitial—rare evidently formed by burrowing under the aponeurosis of the external oblique

**Slit Hernias**—These are hernias in which the opening is narrow and long and sometimes in the midline but rather more often at the outer edge of the rectus They are due to damage usually by suppuration and fascia slough of the insertion of the internal oblique into the sheath of the rectus muscle The incision of Kammerer as has been said is a satisfactory one if good union of the fascia occurs but if the wound be drained and if suppuration in the abdominal wall be prolonged the in

section of the oblique muscle is carried and a retractor of the muscle will open a slit through which a hernia of the

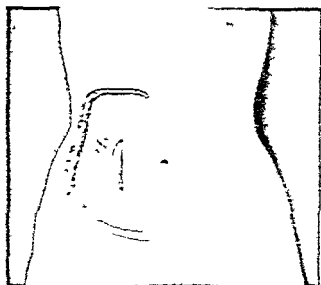


FIG. 111.—Six ventral hernia.

slit-like form occurs. They are at present, I think, the most common form of ventral hernia. It is evident that in the non-



FIG. 112.—Six hernia.

slit be made through the rectus muscle the insertion of the oblique will be left intact, and outward retraction will not occur.

They occur rather promptly usually within three months after the operation and are sometimes associated with an area of

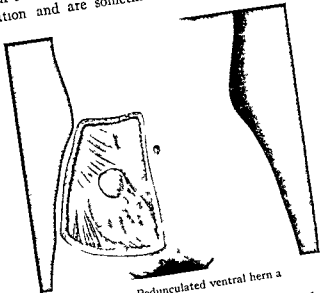


Fig 420 —Pedunculated ventral hernia a

paralysis in the rectus or the internal oblique or both This may be due to section of the nerve supply to the muscle at the

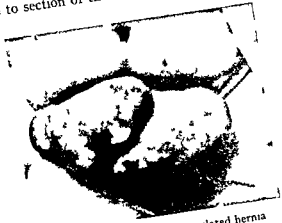


Fig 421 —Pedunculated sacculated hernia

operation or it may be due to a localized neuritis caused by infection In either case it will almost always improve as the

adjacent nerves take up the duty of their disabled fellows or as the neuritis subsides. Unless the hernia or the patient is un-



Fig 422 —Pedunculated hernia

manageable, it is well to wait for six months before operating, when the paralysis will be much better, if not well and the hernia in a better condition for operation

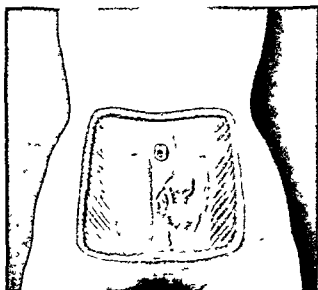


Fig 423 —Sacculated ventral hernia

**Circular Median Line Hernia.**—When a fault through an incision in the midline is bounded on each side by a rectus muscle



of good tone it will be limited to a slit-like opening but if the recti are flabby and if some diastasis has taken place the failure of the central tendon of the abdomen will allow them to be pulled apart and the width of the hernia will increase until it is equal to the length of the fault in other words, it will be circular These are the enormous pendulous hernias or they may be small ringed and pedunculated They may be expected to contain omentum and if at all sizable, large or small intestine, or both

The pedunculated and sacculated hernias are the forms in which one is most likely to encounter cases of strangulation in



Fig. 424 —Sacculated hernia

which the operative mortality is very high, certainly 50 per cent at least In this group are found also the massive hernias most of them sacculated and many pedunculated as well Such cases should be advised to accept operation before they are overtaken by strangulation

The *cribriform* hernias present an interesting form They are due to infection and slow healing usually in a median scar and show several small openings These may be plugged by omentum or one or more orifices may be large enough to admit a little knuckle of gut They are sometimes quite annoying and one opening may increase in size so as to become a pedun

culated hernia or a broad and general bulging of the cribriform area, with increase in the size of several of the openings at the

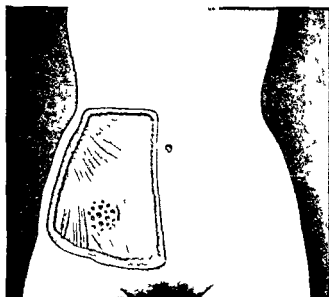


Fig 425 —Cribriform ventral hernia

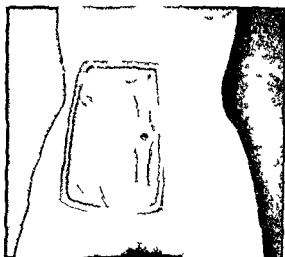
same time, may produce a sacculated hernia with more or less pedunculation.



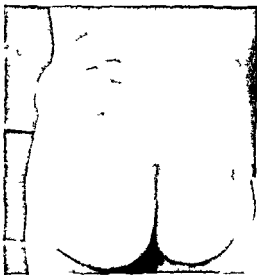
Fig 426 —Cribriform hernia

The most striking form of paralytic hernia occurs after poliomyelitis, and it is fortunately rather uncommon to see

severe forms after laparotomy Still they are by no means rare and the fact that more of them do not appear is probably as



F g 427 —Paralytic central hernia



F g 428 —Paralytic lumbar hernia

Hoguet has said due to the fact that communications between the nerves are fairly numerous and after section of one its

duties are taken up by the nerve that communicates with it. Hoguet's article will well repay careful study. It will be clear that the further back a nerve is injured, the more serious will the damage be, and for this reason, also, it is well to avoid, in general, incisions along the outer edge of the rectus.

The situation in which paralytic hernias are most often found, however, is in the upper portion of the right rectus, secondary to incisions for operation on the biliary tract. The fact that these incisions are sometimes made directly across the fibers of the muscle, and that they often cut obliquely across them, is not in itself primarily responsible. It is the associated



Fig 429 —Recurrent umbilical hernia

damage to several nerves which leaves too wide a gap for the adjacent unharmed filament to bridge.

Massive ventral hernias are distinguished by McGlannan (Surg., Gyn, and Obstet, June, 1915) as those having a ring of not less than 40 cm circumference, or a capacity of 500 c c, as well as smaller hernias occurring in obese individuals whose pendulous abdominal walls require the removal of an area of skin and fat not less than 10 cm. in its short diameter.

McGlannan points out that these cases of massive ventral hernia are much more complicated than simple inguinal hernia. He groups his deaths as due to.

- 1 Cardiovascular conditions
- 2 Postoperative complications
- 3 Strangulation before operation

He emphasizes the danger in returning protruded viscera to a shrunken abdominal cavity especially in the presence of a weakened heart and advises careful preoperative treatment. The patient is put to bed. The bowels kept well emptied by catharsis and an abdominal binder applied padding the hernia if it be irreducible. The binder is gradually tightened and the effect on blood pressure heart action and respiration noted. Later small flat sand bags are added and when the patient has had a week or ten days of this preparation the operation is performed. If strangulation exists resection will probably be necessary and Foss has reported cases in which extensive resection of intestine allowed the satisfactory closure of massive hernias otherwise inoperable. In 1 case he resected the transverse and ascending colon and cecum and about 280 cm of ileum. One would hardly anticipate a fortunate outcome in such a case.

Cases of ventral hernia come to the surgeon in several stages of development

- 1 As small protrusions soon after operation
- 2 As medium sized bulges later with or without symptoms of intra abdominal disturbance
- 3 Large hernias—often in poor risks
- 4 Cases with strangulation

The small protrusion in a healthy patient should be restored as soon as possible after the period in which any paralytic element will have disappeared.

The middle sized hernias even if they are not giving any symptoms should be repaired unless the general condition of the patient or the relaxed condition of the tissues or both are such as to contraindicate. If symptoms of partial obstruction are present the danger of interference must be balanced against the probability of strangulation and a decision made in each individual case.

In larger hernias the same holds true and the careful prep-

aration of the patient in such cases is often as important as the operative procedure.

**Operative Treatment of Ventral Hernia.**—There has been too much standardization in the literature of ventral hernia. Too much taken for granted as to the anatomy of the individual case, but in practice these cases do not lend themselves readily to standardization, and consequently each case has demanded plastic surgery to meet its own peculiarities. This relates to the necessary steps in closure, but an orderly procedure may be adopted in the steps that precede that part of the operation.

A ventral hernia should be thought of not merely as a fault in the abdominal wall, but as an intra-abdominal deformity with or without potential intestinal obstructions and inflamed or adherent omentum.

The incision should allow a careful approach to the sac and its contents, a gentle recognition of the mechanics of the problem, and then as prompt and complete a solution as the circumstances permit. Adhesions of the bowel or its neck should be separated by dissection at the expense of the parietes, and the raw areas covered by inversion with fine catgut suture. Adhesion of bowel to bowel, causing no obstruction, should be allowed to remain undisturbed, but if evident obstruction is present, these adhesions also should be cleared. Bands should be resected, and adherent omentum freed with the resection of masses showing increased thickening, vascularity, and granulation of chronic epiploitis.

Haller and others have shown the relation of recurrent inflammation of the omentum to intermittent pain in hernia.

After this treatment of the contents of the hernia the neck is carefully cleared and the sac cut away, or a portion of its wall may be used to form the inner layer of the closure.

In the second, or muscular layer, one will try to approximate the severed muscles by sutures set in aponeurotic tissue or in scar tissue if necessary, but set in such a way that, where the suture is finished, muscle-fibers may ensheath the belly once more. This will require tension in the larger hernias because the transverse muscles have retracted, but it should be applied,

and in forty eight hours or so the abdomen will have accustomed itself to it and no undue tightness will be felt This is, in part due to the stretching of the retracted muscle and in part to accommodation of its fellow of the opposite side It will require stout suture material set in a double row first a continuous and then a row of interrupted chromic catgut In cases where this approximation cannot be accomplished various forms of plastic flaps must be resorted to

In the closure of the outer layer an attempt is to be made to cover the now restored muscle layer with a restored aponeurosis and here a number of devices have been suggested This layer should be free from tension and whether flaps or fascial transplants are used it should be remembered that they are accessory to the essential deeper layer

In a number of cases I have transplanted flaps from the fascia lata to cover the sutured muscle layers and to bridge gaps in the fascia Such flaps should be large enough to overlap and the interposed surfaces should be quite free from areolar tissue

In all cases stout stay sutures of silkworm gut or strong silk should be set in such a way as to take up the postoperative tension and tied over bolsters placed well to each side of the suture line The patient should be kept well under the influence of morphin for several days after operation

John E. Jennings

## GASTROSCOPY

HENRI F KRAMER

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A COMPLETE examination of the gastric mucosa in a systematic manner is possible with the Schindler gastroscope. We are using one of these instruments at The Brooklyn Hospital, and find it distinctively valuable in the diagnosis of many conditions not discovered by other means. The findings in a few such cases are cited below. Introduction of the gastroscope is made less difficult by using the Hellsley modification. This consists of a flexible metal tube which is stiffened after introduction by a steel mandarin. Over this metal tube the outer tube of the Schindler instrument is slipped into the stomach, the guiding tube and mandarin removed, and in its place is inserted the optic tube containing the lenses and lamp. This instrument was perfected by Schindler of Munich and the modification devised by Hellsley of California. It represents a combination of Teutonic patience and attention to mechanical detail with American ingenuity. By its optical construction is made possible a visualization of the interior of the stomach, showing fields which are well illuminated and seemingly close to the eye, although, in reality, some 70 cm distant. This is a real advance over the direct vision gastroscope without lenses, which, with good fortune, might show an area of mucous membrane, about  $\frac{1}{2}$  cm in diameter, dimly lighted, and the location of which, with relation to the rest of the organ, it is impossible to establish. The only portion not possible to reach is the so called "dark area," about 1 to 2 cm in extent, near the cardia on the lesser curvature. Many factors, developed by much practice, enter into a successful introduction. By far the most difficult part of the procedure, however, is orientation, or determining what part of the gastric wall is displayed in each particular field.



wall changing with the depths as indicated in Fig 430, *C*, and including first the greater curvature, then the lesser, as the instrument is withdrawn

To facilitate orientation Schundler has described stomach meridians. If planes are passed at right angles through the axis of the gastroscope at all possible points of introduction, these planes will cut the stomach wall in variously distorted

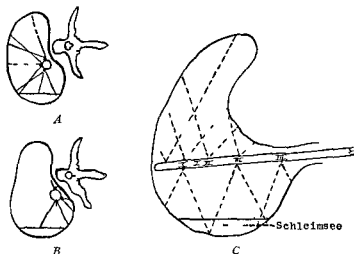


Fig 430—*A* Transverse section of stomach and gastroscope. Knob showing direction of lens and angle of vision. *B* Longitudinal section of stomach and gastroscope. *C* Showing angle of vision at each introduction depth.

lines. These lines are meridians. Many of them are charted in his work.

During the examination the stomach is kept moderately inflated with air. If overinflated, either a sudden eructation by the patient ensues, or the rugæ are flattened out. The natural movements of respiration and peristalsis, and often, in addition, arterial pulsation, make necessary a rapid observation. The lens may become smeared by improper introduction, or by the excess of mucus or other fluid. Much distortion is always present, due to the different degrees of magnification of objects in the visual field at the same time. Although at different dis-

tances from the lens, these objects appear to be in the same plane

A description of the findings in a few of our cases follows

1 A case with ulcer symptoms, but reported negative by the radiographer, was found to have numerous small, gastric erosions

2 A case with a return of symptoms two years after gastroenterostomy for pyloric ulcer, showing negative radiographs, was found to have an ulcer of the lesser curvature Stoma functioning normally

3 A case with a long and persistent gastric history, suspected of ulcer, but found to have simple gastritis

4 A case of gastric hemorrhage found to have a fresh bleeding area on the lesser curvature near the cardia surrounded by purpuric spots, confirming the diagnosis of purpura hemorrhagica

5 A case with carcinoma of the cervix suspected of gastric carcinoma found to have a normal stomach, except for congested mucous membrane Findings proved at autopsy

6 A case of pyloric obstruction with crater of the lesser curvature Crater visualized, and digested blood seen in the mucous pond At operation a perforating ulcer of the duodenum was found in addition

7 A case of pyloric obstruction, following perforated duodenal ulcer operated upon four years previously, found to have normal mucosa on the gastric side of the pylorus

We believe that systematic gastroscopy is made possible with this instrument, and that it is a distinct aid in the diagnosis of otherwise obscure conditions



## BISMUTH SUBCARBONATE AND LIPIODOL IN LUNG MAPPING

FRANK H IASHER

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RADIO opaque substances were first used in the trachea and bronchi by Chevalier Jackson in 1905

Dr Louis H Clerf has devised a special bronchoscopic powder insufflator for the introduction of opaque powders<sup>2</sup> without which the bronchial tree would be practically radiotransparent in the roentgenogram

In addition to bismuth subcarbonate, many other opaque substances have been used for this work such as bismuth subnitrate powder,<sup>1</sup> bismuth in aqueous and in oily solutions<sup>2</sup> solutions of sodium bromid and sodium iodid in water,<sup>1</sup> thorium<sup>2</sup> and several others

Sicard first used lipiodol a vegetable oil containing about 40 per cent by weight of iodin in localizing spinal cord tumors Sargent and Cottenot used lipiodol on adults in outlining the bronchial tree<sup>3</sup>

Bismuth subcarbonate insufflation and the injection of lipiodol are extensively used in the bronchoscopic clinic in Philadelphia, and seem to be the agents of choice

At The Brooklyn Hospital we have used bismuth subcarbonate powder and lipiodol in lung mapping cases without accident, and have made no attempt to use any other opaque substances for this type of work

In the following case report both bismuth subcarbonate and lipiodol were used a few days apart to outline the bronchial tree, and an opportunity is given to compare the results in the same patient

Bismuth Subcarbonate and Lipiodol in Outlining the Bronchial Tree—Mr M J, admitted April 20, 1926, with the

diagnosis of bilateral inguinal hernia, which followed the lifting of a heavy weight five years before admission. There was also a history of a severe cough of three weeks' duration, associated with greenish expectoration and night sweats, but no hemoptysis.

Physical examination of the chest showed diminished resonance of the whole right upper lobe to the third rib and fifth



Fig. 431—x Ray diagnosis before lung mapping. Lung abscess of right lower lobe and mediastinal tumor.

rib, posteriorly and in the interscapular region. There were no tubular breath sounds or increase in vocal or tactile fremitus.

On account of the above chest findings and cough the hernia operation was postponed and the patient was referred to the x Ray Department for examination. The x ray showed increased infiltration through both lungs, with calcification about each hilum, heavy density along the right lower bronchus,

spreading out into the lung tissue above the diaphragm. Part of this heavy density had quite a definite border. The heart shadow was not displaced. The diagnosis was "Lung abscess of right lower lobe and mediastinal tumor" (Fig. 431).

On April 26th this case was referred for lung mapping, which was done with barium subcarbonate according to the method used by Clerf<sup>1</sup> of Philadelphia. Clerf's bronchoscopic powder insufflator was used for the introduction of the opaque powder



Fig. 432—Stereoroentgenogram after insufflation of bismuth subcarbonate in the right lower bronchus

The x ray following the bronchial tree mapping with barium subcarbonate is shown in Fig. 432.

The x-ray report was as follows: "The upper branch of the bronchus seems normal, showing fine bronchioles branching out, but only the main trunk of the lower branch is seen. No small bronchioles are seen, and the bronchi end abruptly. No dilated pockets are seen. The well-defined shadow seen at previous examination seems to lie anterior to the lower branch of the

bronchus, possibly it embeds it. It would seem that the main lower bronchus were dilated.

*Findings*—"Would suggest a tumor or solid mass about lower branch of the bronchus, blocking off terminus of bronchus and its bronchioles. It is possible that the bronchus is plugged."

The first x ray diagnosis, without the use of barium sub carbonate as a means of outlining the bronchial tree had been



Fig 433 —Lung mapping with lip odol

lung abscess and mediastinal tumor. By this method the tumor was located about the lower branch of the bronchus.

It was thought best again to try lung mapping by another method, which was done on May 3d. This time 17 c c of lipiodol were injected through an ordinary lung abscess aspirating tube to the right lower lobe bronchus, the opening of the bronchus having previously been cocaineized. After the injection of lipiodol and the removal of the bronchoscope, through which the aspirating tube had been inserted, the patient was placed on his

right side, and sent for a radiograph. A hypodermic injection of morphin sulphate (gr.  $\frac{1}{4}$ ) was given half an hour before the bronchoscopy and injection of lipiodol (Fig. 433).

Radiograph findings following injection of iodized oil (lipiodol): "Injection of the right lower bronchus with iodized oil shows that it is pretty well diffused through the lower posterior bronchial tree. No pockets noted. The bronchial tree does not appear obstructed as at previous examination, and the definite shadow seems to lie in front of the bronchus outlined. A very little of the iodine is seen at the left hilum. Possibility that apparent irregularity of the right diaphragm is due to tumor rather than to adhesions."

Findings: "Right lower posterior bronchial tree—negative. Probably right chest tumor"

On May 9th a physical examination showed that the lungs had cleared considerably, although there was dulness in the right posterior base and some diminution in breath sounds. A few fine, moist râles still persisted in this area. Otherwise the lungs were practically clear to auscultation and percussion.

On account of the improvement in the lungs, as above noted, it was thought safe to operate on the double hernia. On May 11th a double inguinal hernioplasty was done.

Just what caused the rapid improvement in the chest so soon after the injection of the iodized oil, both as regards the physical signs and the improvement in the symptoms of cough, expectoration, and relief of bronchial irritation, is a little difficult to say. Possibly the iodized oil itself caused the improvement as a soothing agent.

The recovery from the hernia operation was rapid, and the patient was discharged on June 2d.

The day before the patient was discharged the third and last x-ray of the chest was taken, which showed a little of the barium subcarbonate or iodized oil in the bronchi of the right side. The shadow of the tumor was also present, slightly decreased in size (Fig. 434).

This case was selected not to show the simplicity of making a diagnosis by the injection of opaque substances in the bronchial



tree, but rather the difficulties. It is worthy of note that the barium subcarbonate method showed one bronchus either broken off or plugged with mucus while the iodized oil method a few days later showed this same bronchus patent.

There is a possibility that the iodized oil had a beneficial result on the infiltration in the right lower lobe. There is no question that pus was seen coming from the right lower lobe at the first bronchoscopy.



Fig. 434—Twenty eight days after lung mapping with iodized oil showing iodized oil in places.

Lung mapping gives us additional information in select cases of lung conditions.

The following are the indications for its use:

- 1 Foreign body localization.
- 2 Outlining the position and extent of lung atelectasis and terminal abscesses.
- 3 Degree and extent of bronchial dilatation.

4. Bronchial structure :
5. Selected cases of bronchopleural fistula :
6. Growth of the bronchi :
7. The demonstration of other infiltrating processes :
8. Location and extent of tuberculous cavities :

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## RADIOTRANSSPARENT FOREIGN BODIES OF THE ESOPHAGUS—REPORT OF CASE

As all foreign bodies in the esophagus are not radio opaque what other method, in conjunction with Roentgen rays, can be taken to locate these foreign bodies?

In the following case, the history of which pointed to a foreign body either in the esophagus or stomach, x ray results were at first negative, and no foreign body appeared in the esophagus. On account of the extreme youth of the patient an esophageal examination was not made until after another opaque meal of barium was given and a roentgenogram taken. In this second x ray the outline of a button was plainly visible even the four perforations in the button appearing as dark spots. The button itself did not show, but enough of the opaque barium sulphate clung to the button to give its outline and the position of the perforations.

The history of the case is as follows

Patient H. M., aged eight, was admitted on January 17, 1926

*Provisional Diagnosis* —Foreign body in either the esophagus or stomach

*Present History* —Patient swallowed button four days ago. Has been vomiting frequently since, but has retained some fluid. Bowels have moved. Not complaining of pain.

*Past History* —Negative

The patient did not seem to be markedly dehydrated. The heart, lungs and throat were negative. The abdomen was soft, with no tenderness. Extremities negative. There is a notation by the admitting officer that the abdomen did not look like intestinal obstruction and that it seemed unlikely the button could have passed the pylorus. Patient was placed on Murphy drip and fluids.

On January 17, 1926 an x ray picture of the esophagus and abdomen was taken, and no button or other foreign body was

found On January 20th a button similar to the one swallowed was removed from the child's coat and examined by  $x$  ray with the body of the patient superimposed between the tube and the film In one  $x$  ray in which the button was next to the film and patient lying on it the button is very poorly outlined In the other two  $x$  rays in which patient was next to the film with button on upper surface of the body it is not distinguishable A lead marker was used as a guide attached to the same paper



Fig 435 Foreign body (button) in the esophagus but radiotransparent

envelope in which button was enclosed This is seen in all  $x$  rays

*Findings*—Button patient swallowed has only faintest radio density and would not be discernible by  $x$  ray within body of the patient

From the above  $x$  ray findings we knew that we were dealing with a radiotransparent foreign body The question was how to locate it

On January 22d the esophagus was fluoroscoped after an opaque meal of barium sulphate

Films were taken afterward which showed a well defined button in the esophagus overlying the seventh cervical and the first dorsal vertebræ It was shown to be in a slightly oblique position and distending the esophagus The opaque meal was

slightly delayed in passing by the button level of the esophagus (Fig. 435).

On January 23, 1926 a Jackson esophagoscope was passed and the button located in the upper portion of the esophagus. On the introduction of the scope the button was overridden on account of a fold of mucous membrane, but on withdrawing the



Fig 436 —Foreign body (button) in the esophagus after barium sulphate opaque meal

scope slowly and by pressing the end of the instrument to one side the edge of the button presented itself to view. It was then removed with a side grasping forceps. No cocain was used either before or during the procedure. Morphin sulphate (gr. 1/12) and atropin sulphate (gr. 1/250) were given before the esophagoscopy (Fig. 436).

*Conclusions*—Under certain conditions it is quite possible to outline in the esophagus with barium sulphate opaque meal, a radiotransparent foreign body

A composition button although of the faintest radiodensity, may, when  $x$  rayed within the body, be absolutely radiotransparent Whenever a foreign body of the esophagus is suspected, and the esophagus seems to give a negative  $x$  ray, it would be advisable to make another radiogram immediately following a barium sulphate opaque meal •

## DERMOID CYST OF THE URACHUS

JOHN H. LONG

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THIS patient a man thirty four years of age, was admitted to the hospital on November 18, 1926. His previous history had no bearing on the present condition. For the last five weeks his work has been such that it was necessary for him to crank a gasoline motor, and he frequently leaned on or grasped the flywheel to stop it. Two weeks ago he did this with sufficient violence to hurt himself. Four days later he had pain in the region of the stomach and five days afterward felt something give way in his epigastrium and had a sensation of a secretion coming out of the navel. He noticed a yellowish white discharge, and was tender on pressure in the region of the umbilicus.

Three days before entering the hospital he noticed a red mass protruding from the navel. The discharge continued and he was also conscious of some pain and soreness in this region.

Examination revealed a man of rather large frame who was not acutely ill. The umbilicus was everted red and discharging a yellowish white purulent material. A probe introduced in the sinus passed directly downward for about 4 inches and met an obstruction at that point. On palpation a hard definite globular mass could be felt just below the umbilicus about the size of an orange and seemed very definitely to be in the anterior abdominal wall. Pressure on this mass increased the discharge from the umbilicus.

Culture made from the secretion was negative. A provisional diagnosis of infected cyst probably of a dermoid character was made.

At operation on November 20, 1926 a thick walled cystic mass was found lying between the recti muscles and the peritoneum continuous above with the round ligament of the liver.



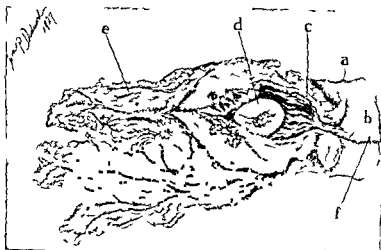


Fig 437 —a Umbilicus b protrusion from umbilicus c cyst wall d contents and hair in calculi e omentum adherent to peritoneum and anterior abdominal wall f round ligament of the liver

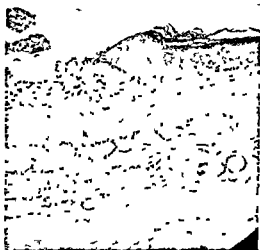


Fig 438 —Photomicrograph showing dermoid lining of umbilical cyst with ulceration Magnification about 80

and below with a non patent urachus This mass was removed intact, together with adherent peritoneum and omentum The cavity of the tumor contained a concretion and three short

hairs, and communicated directly with the outside through the umbilicus

Figure 437 shows the size and contour of the cyst, and the photomicrograph (Fig 438) demonstrates the structure of its walls Dr Nicholas Alter, the pathologist, reported it to be a dermoid cyst, the origin of which could not be determined

Cullen, in his monograph on Diseases of the Umbilicus, discards all but 6 cases reported as dermoids, and concludes that most cases so reported are concretions with infection This conclusion is reached on the ground that incision and drainage would not cure dermoid cysts, and also because of the lack of tissue section evidence It would seem, in view of the fact that this growth was completely removed and that the microscopic section made in this case shows every indication of dermoid cyst, that most of Cullen's objections do not apply in this instance We feel that this can be definitely recorded as a dermoid cyst of the urachus



## OSTEOMYELITIS OF THE LONG BONES

### Outline of the Development of the Present Treatment

PREVIOUS to 1874 osteomyelitis was treated with rest and poultices until drainage and discharge of the sequestrum occurred spontaneously. At this time Sir W. Howes advocated a method which was much nearer to our present treatment than many of the methods which have been tried since. He opened the bone cavity from end to end, lifted out the sequestrum, and allowed the wound to granulate.

In 1881 Hamilton advanced the idea of hastening healing by packing the cavity with sea sponges to furnish a scaffolding for the new bone formation.

In 1885 the first number of the *Annals of Surgery* contained an article by Keetling, of England, in which he advocated sterilization of the bone by scraping out the marrow completely and swabbing with carbolic acid and strong bichlorid of mercury solutions followed by thorough drainage with a large rubber tube.

Attempts to sterilize the bone cavities and obliterate them with aseptic foreign substances or living tissues continued until 1904, when Nichols, of Boston, demonstrated that the bone marrow and endosteum were as important in the regeneration of bone as the periosteum, and that the thorough scraping and strong antiseptics delayed healing. This was finally recognized by most surgeons, who had been having rather disappointing experiences with the bone cavity sterilization and filling methods.

Experience during the World War in cleaning infected wounds of the bones and soft parts with correctly prepared and accurately applied Dakin's solution, after adequate drainage has been established, has convinced us of its value.

Our standard treatment is as follows:

Secure adequate drainage by removal of one half of the circumference of the bone from normal marrow above to normal marrow below, preserve marrow, endosteum, and periosteum,

leave wound widely open and pack with gauze, soaked in 4 per cent solution of Dichloramin T in oil for forty eight hours, then, if removal of the packing does not start bleeding Carrel Dakin dressings are commenced and continued until the wound is clean in appearance and by bacterial count when loose approximation is obtained by secondary suture or strapping. A review of the surgical histories of The Brooklyn Hospital shows that during the past fifteen years, 400 cases of osteomyelitis have been treated. For the material for these observations the long bones only have been considered and no attempt made to tabulate and classify the whole list.

There were

28 acute cases  
53 chronic cases

40 localized cases  
9 diffuse cases

The distribution was

36 tibia  
32 femur  
10 humerus

7 ulna  
7 fibula  
4 clavicle

The infecting organism was

26 *Staphylococcus aureus*  
5 *Staphylococcus albus*

1 streptococcus  
5 mixed infection

Blood cultures were taken only when the patient's condition seemed to indicate a blood stream infection. Five were negative and 2 were positive for *Staphylococcus aureus*, 1 positive for short chain streptococcus, 1 for *Streptococcus viridans*, 1 for *Staphylococcus hemolyticus*. A definite trauma immediately preceded the development of symptoms in 17 of the acute cases. Twelve were caused by direct infection, 2 compound fractures or in amputation stumps. One was caused by the application of a Parham and Martin band and one by Lane plate. Focal infections were proved in 2 cases, 1 furuncle and 1 otitis media.

General infections immediately preceded in 3 cases—1 measles, 1 pneumonia, 1 empyema. In 10 patients more than one bone was involved, but in only one of these was there a

positive blood-culture. These cases may roughly be grouped as follows:

1. Acute localized
2. Acute diffuse with tendency to localize and perforate.
3. Acute diffuse, spreading from epiphysis to epiphysis, and ending in necrosis of the entire diaphysis, or death of the patient.
4. Chronic osteomyelitis following acute which has localized in one or several foci.

We will report a few cases of each group.

**Group I.**—J. L., female, age six years. Admitted August 25, 1925; discharged September 15th Received a bump on left



Fig 439 —J. L. August 18th, ten days after trauma

leg while riding a pushmobile on August 8th. The next day she limped a little, but continued to play around. On August 11th she was seen by her physician, who elicited tenderness over the left tibia and found temperature of 102° F. August 15th x-ray pictures were negative August 18th, ten days after the trauma, x-ray pictures showed some pathology proximal to the lower epiphyseal line (Fig 439). August 25th she was admitted to

leave wound widely open and pack with gauze, soaked in 4 per cent solution of Dichloramin-T in oil for forty eight hours, then, if removal of the packing does not start bleeding, Carrel-Dakin dressings are commenced and continued until the wound is clean in appearance and by bacterial count, when loose approximation is obtained by secondary suture or strapping. A review of the surgical histories of The Brooklyn Hospital shows that, during the past fifteen years, 400 cases of osteomyelitis have been treated. For the material for these observations the long bones only have been considered, and no attempt made to tabulate and classify the whole list.

There were

28 acute cases  
50 chronic cases

40 localized cases  
9 diffuse cases

The distribution was

36 tibia  
32 femur  
10 humerus

7 ulna  
7 fibula  
4 clavicle

The infecting organism was

26 *Staphylococcus aureus*  
5 *Staphylococcus albus*

1 streptococcus  
5 mixed infection

Blood cultures were taken only when the patient's condition seemed to indicate a blood stream infection. Five were negative and 2 were positive for *Staphylococcus aureus*, 1 positive for short chain streptococcus, 1 for *Streptococcus viridans*, 1 for *Staphylococcus hemolyticus*. A definite trauma immediately preceded the development of symptoms in 17 of the acute cases. Twelve were caused by direct infection, 1 *e.*, compound fractures or in amputation stumps. One was caused by the application of a Parham and Martin band and one by Lane plate. Focal infections were proved in 2 cases, 1 furuncle and 1 otitis media.

General infections immediately preceded in 3 cases—1 measles, 1 pneumonia, 1 empyema. In 10 patients more than one bone was involved, but in only one of these was there a

**Group II.**—C. M., aged sixteen. Admitted December 4, 1922; discharged June 30, 1923. Acute osteomyelitis of lower half of right femur. Three weeks before admission he contracted a cold and sore throat. A few days later complained of severe pain in right knee and was treated for rheumatism. December 5th the



Fig 442 —C M December 29, 1922, two weeks after drainage of popliteal abscess

x-ray showed periostitis of the femur. December 7th a large popliteal abscess was opened by lateral incision, and rough posterior surface of femur was palpated. Profuse venous hemorrhage and the patient's poor condition prevented any bone operation at this time. December 21st x-ray showed extensive osteomyelitis and periostitis (Fig 442).



December 23d the patient's general condition had improved sufficiently to have free drainage of the marrow cavity. The incision was extended upward and the lower half of the shaft freely exposed. It was softened and the marrow cavity contained pus, the outer two thirds of the cortex was chiseled away from below upward until normal marrow was exposed, leaving a narrow bridge of soft cortex to preserve the continuity. A Volkman splint was applied, and debridement commenced in forty eight hours. January 26, 1923 the narrow bone ridge had given away, so a cast was applied with large window for dressing (Fig 443).

March 3d a pus cavity containing a sequestrum was evacuated. June 30, 1923 discharged with restoration of continuity,



Fig 443 —C M December 29 1922 showing amount of bone removed and fracture of the remnant

walking with Thomas ambulatory splint, had a sinus with slight discharge (Fig 444)

Another case in which the localization included one half the bone, in which we felt that we could not wait for the sequestrum to separate because of prolonged sepsis, although as it was a femur and so had no supporting parallel bone, we were very anxious to wait for a strong sequestrum.

C S age eight years. Admitted September 8, 1926, discharged January 30, 1927. Pain and swelling of left knee with disability for six days before admission, no injury. On admission there was very evidently a large popliteal abscess. Temperature 104° F, pulse 140. X-ray pictures negative for bone pathology.

September 9th, through and through lateral drainage was made which revealed roughness on the inner side of the internal condyle. Cultures from the pus showed *Staphylococcus aureus*. The patient's condition did not warrant extensive surgery. After drainage of this abscess his condition improved but it was evi-



Fig 444—C M October 31 1923 continuity restored and osteomyelitis of lower fragment

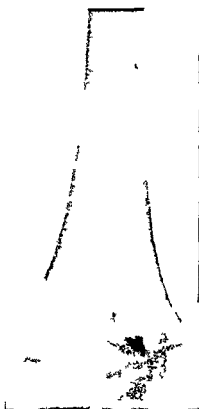


Fig 445—C S September 17, 1926 fifteen days after onset

dent that there was bone infection. September 17th, *i. e.*, fifteen days after the onset of the illness the x ray showed definite osteomyelitis of the lower half of the femur and spotty areas in the upper half (Fig 445). By October 19th it seemed evident that we could not wait longer for a strong involucrum, as a rising

temperature indicated the necessity for more thorough drainage this could be secured only by removal of the sequestered lower half of the diaphysis which could be seen in the wound to have separated from the lower epiphysis. Therefore on this date seven weeks after the beginning of the illness the wound was en-

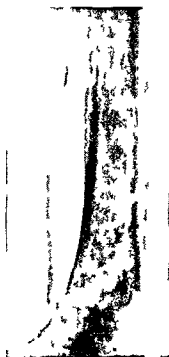


Fig 446—C S October 14th seven weeks after onset the involucrum surrounding the sequestered lower half is firmly attached to the upper half



Fig 447—C S October 27th after removal of the sequestered lower half the involucrum lined up for union with the upper half

larged and the lower half of the diaphysis which was necrotic and separated from the lower epiphysis but firmly attached above to the upper half of living bone (Fig 446) was divided just above the juncture of living and dead bone with bone cutting forceps and removed through the soft involucrum. This gave ample drainage the cavity was packed with dichloramin T

gauze, and later dakinized (Fig. 447). The results seemed to justify the procedure. It was treated as a fracture with traction, and the femur is now firm and full length (Fig. 448) He was

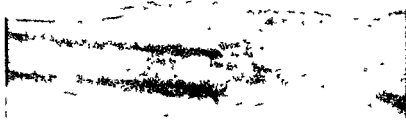


Fig. 448—C S December 4th, union between involucrum and upper half is firm

discharged from the hospital with ambulatory splint January 30, 1927

Another case in this group which only secondarily involved a long bone presented several points of interest

S N, age nine years, first admission August 30th to November 1, 1926 Second admission November 22d to December 2, 1926 One week before admission, *i. e.*, August 23d, patient got wet Next day did not get up because of high fever and headache The nose was swollen, and the patient was delirious for two days, then began to complain of pain in left ankle which continued until admission

*Examination*—Nose swollen, with fluctuating area  $1\frac{1}{2}$  cm. in diameter on left side of bridge Diffuse moderate swelling of left ankle and foot, which is red and fluctuating, foot held in extension, and tender to palpation Temperature  $104^{\circ}$  F, pulse 130, respiration 40 August 31st the ankle was drained of 2 ounces of thick yellow pus, and rubber drainage tubes inserted; there was roughening of the articular surface of the bones of the ankle-joint The abscess of the nose was also drained Cultures from both pus collections and a blood-culture showed *Staphylococcus aureus* Three blood transfusions of 200 c c. each were

crotic and lying loose in the periosteum. It was removed. The shaft of the tibia was also necrotic and separated from both epiphyses. This was easily removed, leaving the periosteal tube, which was dakinized until clean. The x ray pictures show the preoperative condition (Fig 450) and the progress of regeneration. She was discharged April 18th, with small granulating area at site of incision. The newly formed tibia was quite firm (Fig 451). We think that this child has made a better recovery than she would have done had we attempted to drain the bone at the first operation when the localized process had evidently become diffuse judging from the severity of the symptoms in spite of spontaneous drainage.

**Group IV Chronic Localized Single Focus**—L. M., man, twenty six years of age. Admitted October 12, 1921, discharged



Fig 452—L. M. October 13 1921 osteomyelitis of ten years duration there is a small sequestrum in the marrow cavity at the bottom of the sinus

November 1 1921. Had osteomyelitis of lower half of left femur for ten years during which time a sinus would appear at intervals on the outer side of left thigh (Fig 452). This had been explored and curetted in another hospital five months before, without benefit. On admission to the hospital he still had a sinus at about the middle of the outer surface of the left thigh. Cultures from this sinus showed short chain streptococcus, pneumococcus, staphylococcus and colon bacillus. An ample incision showed that this sinus extended into the marrow cavity with a strip of fascia caught in the bone sinus. When the outer half of the cortex was removed a sequestrum  $\frac{3}{4}$  inch long was found and included with

the walls of the cavity which were removed to normal marrow above and below (Fig. 453). The wound was left open and



Fig 453 —L. M. November 3, 1921, bone defect twenty days after operation

dressed with Dakin's solution until clean, when a secondary suture was done; total hospital stay twenty-eight days. An x-ray picture taken March 14, 1924 (Fig. 454) shows defect at the site

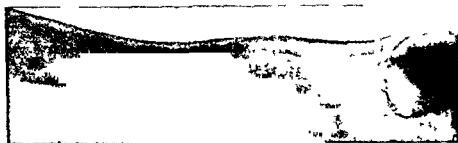


Fig 454 —L. M. March 14, 1924, regeneration after two and one half years' unrestricted use

of operation, but the bone is sufficiently strong for complete function and weight bearing.

*Brodie's Abscesses.*—There were three Brodie's abscesses in 1921, all of which healed promptly after our routine treatment.

*Multiple Foci.*—P. L., age seventeen years. First admission December 26, 1923. He had been operated at the Samaritan Hospital in 1917, for osteomyelitis of the right femur and had been well since then until four months before admission to The Brooklyn Hospital, when a sinus began to discharge on the inner side of the right thigh (Fig. 455). x-Ray November 28, 1923. The sinus was followed into a bone cavity containing

a sequestrum. This and two sides of the cavity were removed, the wound was dakinized and cleaned, and healed promptly.



Fig 456—P. L. September 8, 1924, localized infection of left humerus

Second admission, September 22, 1924, osteomyelitis of left humerus (Fig 456). This was treated by our regular method.



Fig 455—P. L. November 28, 1923, chronic infection of right femur

and good recovery resulted. Third admission, September 21, 1925. Osteomyelitis of right humerus (Fig 457) was treated in

the same way with same result. Cultures from the wound showed *Staphylococcus aureus* and short chain streptococcus.

L. W, age fifteen years In hospital from April 22 to July 15, 1925.

*Hospital History*—One year ago fell on his left knee; shortly after noticed swelling about the knee. This persisted for several months and began to discharge on the outer side and posterior



Fig 457 —P L September 17, 1925, localized infection of right humerus

surface. It has discharged seropurulent fluid ever since; can bend knee only a few degrees. Examination showed chronic sinus on anterior and posterior surface of left lower thigh. x-Ray (Fig. 458). When he was a small child had a fall and was taken to Kings County Hospital, where he was operated on and stayed for several months. April 25, 1925 operation performed. Sinus on outer side was opened and followed inward to a bone cavity at about the junction of the middle and upper thirds of the femur.



A probe in the internal sinus entered this cavity. One-third of the outer circumference of the bone overlying this cavity was removed, it was very dense. After forty-seven minutes operating the pulse was 180, so the wound was packed with dichlor-



Fig 458 —L W April 24, 1925, old fracture, osteomyelitis



Fig 459 —L W July 21, 1925, after second stage of multiple stage attempt to remove infected foci

amin-T and operation discontinued June 11, 1925, as the boy was in good condition, a second attempt was made to remove more bone all but the anterior strip was removed from the area containing the cavity (Fig 459) The patient reacted very well

from this operation and the wound cleaned up well with dichloramin T, so that we hoped to get all the cavities gradually cleaned out, but at the request of his family, he was taken out of the hospital July 15th

P P, male, age thirty one years Admitted November 23, 1926, discharged December 16, 1926 Fracture of right tibia thirteen years before, which was treated by open operation and Lane plate He has had a discharging sinus ever since with occasional pains (Fig 460) On November 24th the plate, which



Fig 460 —P P November 15 1926 thirteen years after bone plating

was deeply embedded in very hard bone and four screws, each of which occupied a discharging sinus in the cortex of the bone, were removed through a curved incision The gutter was chiseled out to a flat surface the wound left open and dakinized One culture November 26th showed *Bacillus coli* On November 28th the wound showed *Staphylococcus aureus* The wound cleaned rapidly and the patient was discharged to the out patient department with narrow granulating area December 16, 1926

## CONCLUSIONS

1 Acute osteomyelitis is not demonstrable by x ray in the first seven days

2 Extension of bone infection into the surrounding soft tissues without gross perforation of the cortex is best treated by *drainage of soft tissue infection only until the extent of the bone infection can be demonstrated by x ray*

3 In view of the high mortality of acute diffuse osteomyelitis when treated by free drainage or drill holes and the ultimate recovery of many seemingly neglected cases we are considering the advisability of waiting for localization or massive sequestration before operating

## A CLINIC FOR DISEASES OF THE RECTUM

A W M MARINO

---

THE rectal clinic had its origin in the gastro intestinal division of the Medical Department over two years ago. The work grew rapidly and soon reached a point where we were seeing from 6 to 15 rectal cases each clinic day.

In June, 1926 the rectal clinic was transferred to the Surgical Department, where it is now.

At present we occupy a room adjoining the general surgical clinic. The window of the room is provided with a heavy shade so that it can be darkened when necessary. A large sink occupies one corner, and another corner is partitioned off and used as a dressing alcove. In the way of furniture we have a Hanes rectal table which can be adjusted for the knee-chest, inverted, lateral, or lithotomy positions. We are also provided with the necessary side tables, an instrument cabinet, a sterilizer, dressing basins, etc (Figs 461, 462).

Figure 463 shows the ano-scopes, procto-scopes and sigmoidoscopes in use.

Figure 464 shows the remainder of the armamentarium requisite for the conduct of such a clinic.

The remainder have been described or are self explanatory.

Following are the types of cases which are seen, in the order of their frequency.

|                             |                            |
|-----------------------------|----------------------------|
| Hemorrhoids                 | Rectal strictures          |
| Proctitis                   | Diverticula of lower bowel |
| Hypertrophied anal papillæ  | Sigmoiditis                |
| Fissure in ano              | Polypi of lower bowel      |
| Hypertrophied rectal valves | Carcinoma of lower bowel   |
| Colitis                     | Rectal atony               |
| Prolapsus                   | Anatomic deformities       |
| Syphilis                    | Worms                      |
| Anal fistulæ                | Anal furunculosis          |
| Pruritus ani                | Rectovaginal fistulæ       |
| Cryptitis                   | Coccidyloma                |

## CONCLUSIONS

1 Acute osteomyelitis is not demonstrable by x ray in the first seven days

2 Extension of bone infection into the surrounding soft tissues, without gross perforation of the cortex, is best treated by drainage of soft tissue infection only, until the extent of the bone infection can be demonstrated by x ray

3 In view of the high mortality of acute diffuse osteomyelitis when treated by free drainage or drill holes and the ultimate recovery of many seemingly neglected cases, we are considering the advisability of waiting for localization or massive sequestration before operating

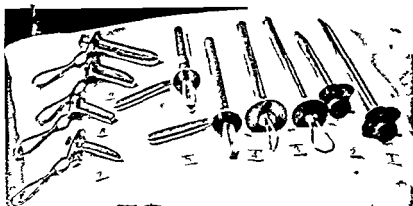


Fig 463 —Ano-scopes proctoscopes and sigmoidoscopes 1 2 Montague's sigmoidoscope and proctoscope respectively 3 4 Yeoman's proctoscope  $\frac{1}{4}$  and  $\frac{1}{2}$  inches in caliber respectively 5 6 Kelly's long and short proctoscopes respectively 7-9 Hirschman's anosopes of various sizes with slanting openings and oblique obturators 10 operating proctoscope

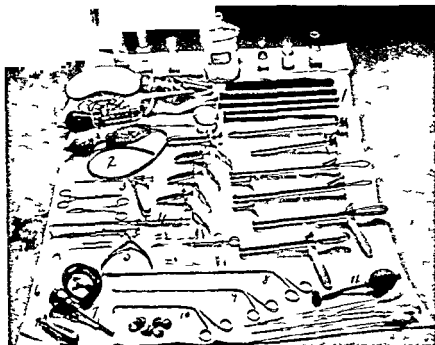


Fig 464 —Equipment requisite for the conduct of a rectal clinic 1 Wale's bougies for dilating anal or rectal strictures 2 Montague's bulb for attachment to the proctoscope 3 wire snare 4 suction tube 5 valvotomy clip forceps 6 Hirschman's valvotomy hook 7 suction apparatus (faucet attachment) 8 biopsy forceps 9 alligator forceps 10 rectal angular scissors 11 Yeoman's bulb for attachment to the proctoscope

It is needless to say that the systematic, orderly examination of patients with symptoms suggestive of rectal pathology has been a decided aid in the diagnosis and proper care of a large group of cases in which lax and inadequate methods previously led to errors of diagnosis and inadequate surgical care

## THE PREOPERATIVE ADMINISTRATION OF DIGITALIS WITH REPORT OF AN ILLUSTRATIVE CASE

EDWIN P. MAYNARD, JR

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THE routine use of relatively small doses of digitalis as a preoperative measure to "fortify the heart" has recently been subjected to careful study, with the result that considerable doubt has been thrown upon the efficacy of this procedure. Through the work of Eggleston and others it has become well recognized that the digitalis bodies have little if any action until they reach a relatively high concentration in the body (1 or 1.5 c c of the tincture per 10 pounds of body weight). Furthermore, to attain this concentration, the drug must be administered in large amounts rapidly in view of the fact that an equivalent of at least 1 c c of the tincture is excreted by the body each day. Moreover, Marvin, *et al*,<sup>1</sup> have shown that, given a normal heart before operation, complete digitalization did not influence the blood pressure, pulse pressure, or outcome in a variety of surgical procedures.

In the relatively normal heart or in the slightly damaged heart where there is no evidence of heart failure digitalis has little if any value. Furthermore, if heart failure does develop following operation, the full effect of the drug can be obtained in such a very short time by the newer methods of massive dosage that there seems to be no need of preoperative digitalization in the absence of heart failure.

If, however, before operation there is definite evidence of congestive heart failure, the administration of digitalis is indicated, just as it would be if no operative procedure were contemplated, and in doses adequate to produce the full physiologic effect.

<sup>1</sup> Marvin H. M. *et al*. Arch. Int. Med. vol. 35 p. 795



Some of the unfortunate effects that may result from the preoperative administration of digitalis in the absence of heart-failure are well illustrated by the sequence of events in the following case

No 3177 25 was admitted to the Surgical Service March 31, 1925 with the classical signs of a long standing prostatic obstruction. There was marked nitrogen retention in the blood and a very low phthalein output. Before cystotomy, while still toxic from his bladder obstruction, the patient was sent for x ray study. He was annoyed by the presence of an indwelling catheter, and the manipulations necessary to take the pictures resulted in much pain and in partial collapse, in which the patient felt very weak and faint. The pulse became rapid, irregular, and of poor quality. Digitalis therapy was begun at once in the following manner. Six c c of digifolin subcutaneously in two days and then standardized tincture of digitalis by mouth in doses varying from 30 to 60 minims a day over a period of thirty six days, for the last twenty of which the dose was 60 minims a day. Deducting a probable excretion of 20 minims a day or a total of 48 c c, the patient retained or utilized approximately 66 c c of the tincture.

The full digitalis effect can regularly be obtained by an amount equivalent to 1.5 c c of the tincture per 10 pounds of body weight. In this instance the patient weighed 180 pounds and his theoretical dose, therefore, should have been 27 c c. Over a period of thirty six days he accumulated 39 c c in excess of his theoretic requirement for full physiologic digitalis effect.

A medical consultation was requested at this point and further history taken then revealed the fact that the patient had been subject to premature contractions for at least twenty years, but without symptoms or signs of heart failure. The rheumatic diseases and syphilis were denied, and the blood Wassermann reaction was negative. Physical examination at this point showed a heart that was not appreciably enlarged. The sounds were of good quality and there were no murmurs. There were no signs of congestive heart failure. x Ray of the heart at the 2 meter distance confirmed the absence of cardiac enlargement. At the

time digitalis was begun the heart was regular except for occasional premature contractions

Thus it is clear that we were dealing with a relatively normal heart, which was subjected to heavy digitalis medication over a

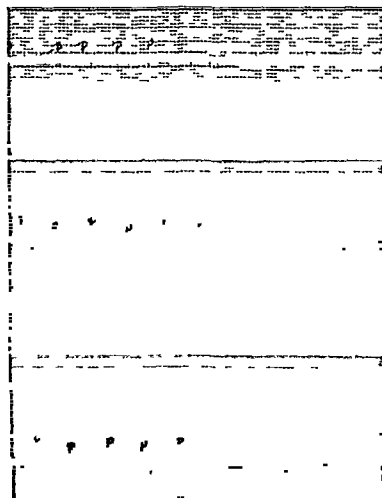


Fig 465 —Auricular tachycardia with 2-1 heart block May 7 1927

*Note* In this and subsequent illustrations the three leads are shown Leads II and III reading from above downward

long period of time, in the hope of getting the patient in better condition for prostatectomy It was an excellent opportunity to observe the toxic action of digitalis on the relatively normal human heart

When first seen at the end of the long period of digitalization the heart showed many premature beats with long runs of coupled rhythm. A series of electrocardiograms was ordered and the subsequent course of events can best be shown by a description of these tracings.

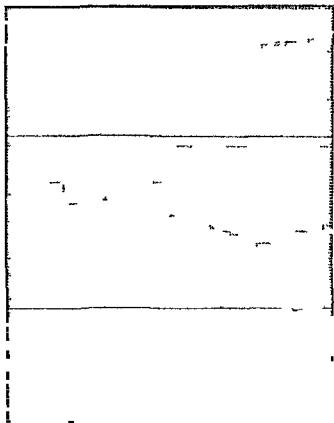


Fig. 466—Auricular fibrillation May 11, 1925

Following the coupled rhythm on May 7, 1925, an auricular tachycardia at the rate of 160 auricular beats per minute developed and at the same time A-V conduction was prolonged resulting in 2:1 heart block with a ventricular rate of 80 (Fig. 465). These phenomena are explained by the double action of

digitalis, first increasing the irritability of the auricle, and at the same time prolonging auriculoventricular conduction time

The next step was the disappearance by May 11, 1925, of any evidence of contraction of the sinus node and total arhyth-

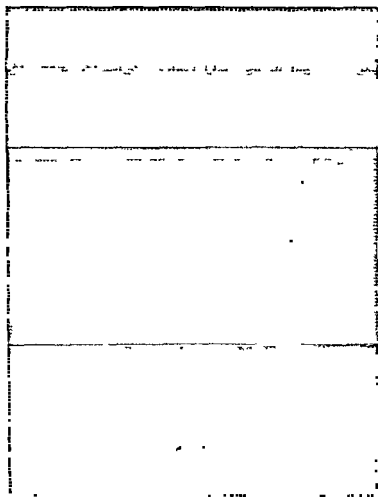


Fig 467 —Auricular fibrillation May 13, 1925

mia of the ventricle, in other words, auricular fibrillation (Fig 466) The curves are marred by technical difficulties, but the total irregularity and absence of P waves is well shown

It should be stated here that all digitalis medication had been stopped before the first tracings had been made

On May 13, 1925 auricular fibrillation still persisted (Fig 467), but by May 18, 1925 sinus rhythm had returned (Fig 468). There was still some delay in A V conduction with an occasional blocked, premature auricular beat in which premature

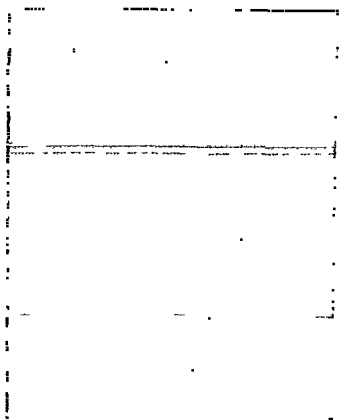


Fig 468 —Prolonged auriculoventricular conduction. Note the locked premature auricular beats in Leads II and III. May 18, 1925.

P waves appeared but were not followed by their expected ventricular beats.

By May 21, 1925 the heart had returned to the normal mechanism except for slight prolongation of A V conduction up to 0.22 second (Fig 469), and on May 27th an entirely normal cardiac mechanism had returned (Fig 470).

The action of digitalis on the T wave is well shown in this series. At first the T waves were inverted in Leads II and III, and very small in Lead I (Fig 465). Gradually they became taller in Lead I as the digitalis effect wore off, became diphasic

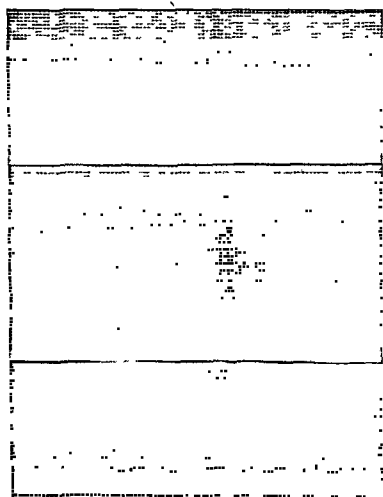


Fig 469 —Prolonged auriculoventricular conduction May 21, 1925

in Leads II and III (Fig 467), and finally upright in all leads (Fig 470)

Thus, to summarize the effect of digitalis upon this heart, the sequence of events was as follows. The premature beats for which the medication was given became more frequent until they occurred every other beat for long periods producing

bigeminal rhythm. Following this, irritation of the auricles appeared with a rare phenomenon, auricular tachycardia, and at the same time the first signs of heart block, resulting in the loss of every other ventricular beat. Next appeared typical auricular

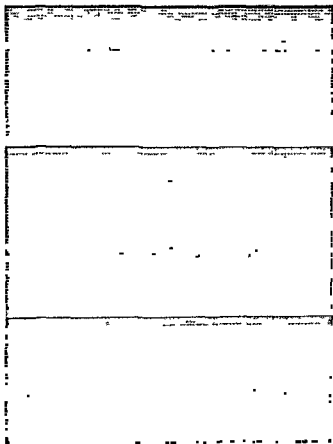


Fig. 470—Normal cardiac mechanism May 27 1925

fibrillation which persisted for three days, and then the signs of digitalis poisoning began to disappear with gradual return to the normal cardiac mechanism. It is of great clinical importance to point out two facts. First, that the full effects of digitalis poisoning appeared without any trace of the usual warning sign of

nausea, and second that they were produced by the so called slow method of digitalization over a period of thirty six days

A rather incomplete survey of the literature reveals only 6 reported cases of auricular fibrillation due to digitalis Sir James Mackenzie, 1, Danielopolu, 3, W D Reid, 2 The latter author reports 1 case of auricular tachycardia with a 2-1 heart block, similar to the patient here presented, but in this case auricular fibrillation did not develop

It may be concluded from the evidence in this case that dangerously toxic rhythms, including auricular fibrillation, may be produced by digitalis by the slow method of administration in the relatively normal heart The experience gained in this patient only adds to the growing conviction that caution should be used in the preoperative digitalization of patients who are considered poor operative risks The indications for its administration should be clear cut and definite and the method of employment and dosage should be carefully determined





## RUPTURE OF THE LONG HEAD OF THE BICEPS CUBITI

DONALD E. McKENNA

---

THE reason for discussing this case is prompted in part by the small number of recorded incidents of rupture of the biceps. There are eighty one such surgical accidents available in the literature, no more than fifteen of which have come to operation and in only one (Ludington's<sup>1</sup>) has there been incorporated a pathologic report.

The essential features of the report appended are that a man of forty five years who had been otherwise healthy experienced sudden pain in the region of his right shoulder while changing signs in a subway train of which he was the conductor. When examined four hours later typical bulging of the belly of the biceps with an absence of the tendon of the long head from its normal site was noted. Four days later operation revealed the tendon as shown in Fig. 471 and repair accomplished by a side to side suture of the long to the short head at a point just below the coracoid process as in Fig. 472. Although he left the hospital on the seventh day after operation with a healed wound with every promise of a rapid recovery his convalescence was complicated by a subdeltoid bursitis causing one hundred and sixty days to be consumed in his rehabilitation.

**Case Report**—S. R. age forty five male white Russian

*Complaint* Pain in the region of the right shoulder and weakness of the arm

*Present Illness*—Four hours ago (December 18, 1925) while changing signs on a subway car experienced sudden sharp pain in the region described above followed immediately by a snap causing him to think that the shoulder was dislocated. A fellow workman pulled the extremity but the pain persisted.

*Family and Past History*—Irrelevant

*Physical Examination*—Negative except for the local condition

Locally, the right shoulder was carried on a relatively anterior plane to that of the left. There was no tenderness over the acromion process or deltoid muscle. Signs of ecchymosis were absent. The depth of the bicipital sulcus was increased and a focal point of tenderness was present just below the coronoid process (Figure 471 shows the ruptured head to have occupied this po



Fig 471

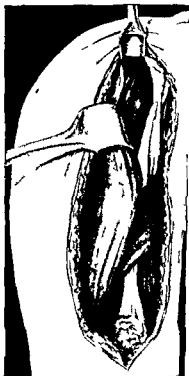


Fig 472

Fig 471 — Condition found upon exposing the tendon

Fig 472 — Relation of both long and short head after suture

sition) The muscle belly was spheroidal rather than spindle shaped, was lower down on the arm, and more flabby than its opposite. The head of the humerus was not dislocated. Motions of the affected shoulder joint were less vigorous, more jerky and painful than the unaffected side, but no essential motion was lost. The forearm was free from symptoms or signs of injury.

*Laboratory*—*Urine* Albumin, faint trace Sugar, moderate amount Microscopic, occasional granular cyst, a moderate number of pus cells

*Blood Wassermann*—Negative

*x Ray*—Right shoulder was negative for bone pathology No evidence of osteo arthritis was observed

*Operation*—Tenoplasty and transplant (December 22, 1925, four days after injury) An incision was made from the coracoid process, downward and slightly outward on the flexor surface of the arm, to a point 1 inch below the deltoid tubercle The bulging belly of the biceps was identified beneath the deep fascia, which, when opened, disclosed the relaxed tendon of the long head lying in the sulcus, its distal portion folded and proximal end sharply angulated, bulbous, and drooping (Fig 471)

*Note* This relation of the tendon corresponds with but 3 of the reported cases "DaCosta's, reported by Keen<sup>2</sup>, Wydler's<sup>3</sup> reported from de Quervain's Clinic in Switzerland, and Gil creest's,<sup>4</sup> from the University of California Medical School, reported by himself "

There was neither fresh nor organized blood clot along the course of the tendon, but minute calcareous plaques and a decidedly yellow color of the entire structure was observed The proximal or ruptured end was frayed out, and along the margin was a thin, black line, the result of either necrosis or hemorrhage, most probably the former

The slack was taken up and about 3 cm of the tendon, including the bulbous end, was resected The stump was then trans fixed to the short head by a side to side anastomosis (Fig 472)

*Pathologic Report*—*Question* Are degenerative changes present in this tendon? If so, are they part of a local or general condition?

*Examination*—The specimen is  $2\frac{1}{2}$  cm in length and 4 mm in thickness The tissue is shiny and dense on cross section Degenerative changes exist and give every evidence of being responsible for the rupture The individual fibers of the tendon are enlarged, but the fibrillæ while present in some places, are absent in others, giving the fibers an irregular, lumpy texture

Staining reactions vary greatly from stainless to a deep violet (The latter being areas of complete calcification) Calcium deposits are noted in some of the necrosed cells while in others lipid granules are present and still others were observed in which the fatty acids were undergoing saponification by virtue of the presence of calcium

*Diagnosis*—Chronic tendinitis—calcareous, fatty, and myxomatous degeneration leading to necrobiosis

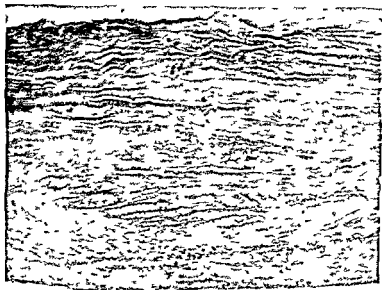


Fig. 473—Large spaces partly filled with soapy and calcific material. Mucinous changes in enlarged bundles of fibrillae

*Answer*—It is more probable that the degenerative changes in this tendon are part of a general process (Figs. 473-474)

*Postoperative Course*—Uneventful. Stitches removed and patient discharged on the seventh day

*Follow up*—Passive motion commenced on eighteenth day, baking and massage on the twenty-first day, diathermy and active motion on the thirtieth day. Developed a subdeltoid bursitis and continued massage, baking and diathermy were necessary until the one hundred and sixtieth day postoperative when he was returned to work.

*Comment*—The pathologic findings above described coincide with Ludington's conviction. Expressed in slightly different words than his but retaining the essentials of his thought, classification of rupture of the biceps tendon can be applied as follows:

Etiologically—either (a) Non traumatic (spontaneous) or  
(b) Traumatic

Anatomically—either (a) In the bicipital groove, or  
(b) Outside (below) the bicipital groove

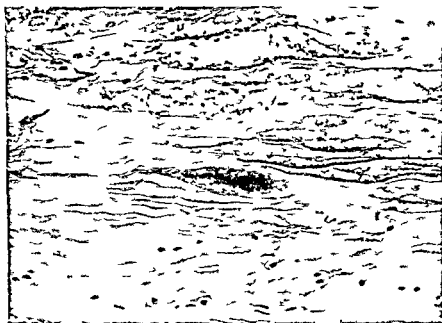


Fig. 4.4—Higher magnification of degenerative changes in tendon. The fibrille have completely vanished in places.

Those in which the rupture is in the groove are pathologic and essentially not the result of trauma (spontaneous), while those outside the groove are essentially traumatic (non pathologic), the pathology being but incidental to the extreme force producing the injury. In 2 of the 3 reported cases which parallel this one, DrCosta's was fifty-two years old, and the accident happened while lifting a heavy bucket. Keen, in reporting this, agrees with G. G. Davis<sup>5</sup> who concluded in 1895 when he reported 4 cases of his own that 'a ruptured tendon is usually a diseased

tendon " Gilcreest's patient was fifty eight years old, and sustained his injury while lifting a 100 pound weight with a fellow-worker (This certainly is not an excessive weight to be divided between two men) The author did not comment on the relation of disease to his patient's accident, but elsewhere in the text states "that there can be no question that disease plays an important rôle in many cases " In my own case I cannot conceive of the little windlass which operates the destination signs in the subway cars demanding enough force in its operation to cause a rupture of a healthy tendon, even in a subject much older than forty five years

As Ludington concludes "If further observation supports the foregoing (his theory) there is in addition to its academic interest, an added value, as it may aid in establishing the rights of parties at interest in those cases which come within the domain of the Workmen's Compensation Law "

It is for this added reason that I have reported, in detail, what seems to be so simple a problem Twenty cases in detail will permit of more satisfactory deductions than can be arrived at from a study of many of the eighty-odd which have gone before For example the only facts that I could ascertain about Sanson's<sup>6</sup> case in 1834 was that a man, while loading manure, ruptured his left biceps tendon in its mid portion and that the treatment, which consisted of rest and bandaging, resulted in a complete recovery within twelve days

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## A CASE OF BLADDER CARCINOMA WITH A BRIEF REVIEW OF A SERIES OF CASES

WILLIAM F. MCKENNA

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THIS patient is presented just one year after her discharge from the hospital. She was admitted April 22, 1926, and was discharged May 19, 1926. Her principal complaint on admission was hematuria of three months' duration, with frequency of urination and urgency for a period of five years. Six years prior to admission her gall bladder had been drained for digestive disturbance and one year later had an oophorectomy and uterine suspension for the urinary frequency, of which she still complained when seen after her first attack of hematuria. Cystoscopy at the time showed a very definite mass in the region of the left ureter orifice with all the characteristics of a carcinoma. The mass was solid about the size of a hen's egg, showed a hemorrhagic area on its anterior surface suggestive of recent bleeding, and could be distinctly palpated through the abdominal wall by bimanual examination. There had been a loss of weight of nearly 10 pounds in the three months since hematuria began, and the patient appeared anemic. There was, according to the medical consultant, a mild degree of myocardial degeneration, but not enough to contraindicate operation. On May 30, 1926, through a suprapubic cystotomy, the tumor was approached and found to be densely hard and intimately attached to the bladder by a broad base with what seemed like infiltration into the pelvic tissues. No attempt was made to resect the growth because of its proximity to other structures. Diathermic current was applied until coagulation was established throughout the mass and into healthy tissue surrounding the growth. Fifteen radon seeds of the gold type were inserted into the mass and beyond it, each



seed of approximately 2 millicuries giving a total implantation of 29.4 millicuries of emanation or an estimated total of 3910.2 millicurie hours. A small section of the mass removed before coagulation showed a medullary carcinoma of very pronounced malignancy according to the later report of the pathologist.

She made a fairly smooth recovery from the operative procedure and was discharged with a small suprapubic sinus which still drained urine although she voided almost entirely through the urethra. After leaving the hospital she regained considerable strength and this would seem to be true of many patients observed having radium or emanation therapy. While the effect of the radium persists there seems to be a moderate depression with malaise and general indifference. This began to abate in this instance about a month after the operation and the patient was able to be up and about at the end of her sixth postoperative week. She then had heavy x-ray therapy for a period of one hour applied to the bladder and pelvic region and over the liver area for six consecutive days. She has been seen at intervals since operation but has always been afraid of cystoscopy. However a fair estimate of improvement could be gathered by pelvic examination during this year past and in March 1927 the patient was cystoscoped and there was no mass visible in the operated field and the bladder was normal. It did not seem at the time of operation that this patient would be alive at this time for the reason that the pathologic prognosis was extremely bad and the type of cell especially malignant.

This case and the apparent recovery although only one year has elapsed since operation prompted a review of some of the cases seen during the past few years and 48 cases were found in our records previous to three years ago. In order that results may be discussed we have not included the cases observed and cared for during the past three years. This period was found also to coincide with the beginning of the general use of radium or radium emanation with the lessened use of resection except in the most favorable cases.

In all 48 cases were found of which 37 were males and 11 were females. The average age of both sexes was sixty three

and a third years; of the males the average age was sixty-four and two-thirds years and of the females, fifty-eight and two-thirds years. The youngest patient was thirty years of age, and the oldest was eighty-one. The youngest male was thirty-seven.

Of the symptoms observed, hematuria was the most frequent, occurring as the first sign in 24 cases. It had been observed in 1 case eleven years before seeking operative relief, the longest period in this series. The shortest interval between first appearance of blood and examination was ten days. The average time elapsing between first noting hematuria and operation was fifteen months. The total number in which hematuria occurred as a first symptom was 39, the additional 15 cases observing this symptom as a secondary complaint.

Frequency of urination was noted as the first symptom in 15, and this sign had appeared from four and one-half years to three months before operation, with an average of seven months.

Incontinence of urine was noted in 2 cases, existing one year in each case.

Pain in the bladder region was observed in 5 cases, from two years to two months previous to operation, with an average of nine months.

Sacral pain was observed in 1 case, existing for six years.

Pain at urinary meatus was present in 1 case, existing for five months.

Loss of weight was very indefinite, and when it occurred the patient usually attributed it to natural causes, and it does not stand prominently as a symptom in bladder sarcoma.

In the 48 cases operation of some nature was performed in 39. Three cases were too weak and advanced in the disease to consider any surgery. Three patients refused operation. One case was obviously inoperable. Two cases were treated through the cystoscope, with direct implantation or application of radium.

Of all the cases, including the inoperable, 31 are known to be dead, 13 are known to be alive and well, and 4 cases have not been traced.

were 31 With such an allowance however carcinoma of urinary bladder is an extremely fatal condition in which all surgical and physical resources at our command must be freely employed

This discussion deals only with cases of proved bladder cancer and does not of course include the non malignant papillomat

Frank L. Stogdell

## A CASE OF STONE IN THE FEMALE URETHRA

STONE in the female urethra is seen rarely enough to justify the following brief case report

This patient was admitted to the Outpatient Department of The Brooklyn Hospital on January 30, 1924. Her principal complaint was that she had had, for about two years, an almost constant pain in the left side of her back, which at intervals of two to seven days would become unusually severe. This pain dated, in her opinion, from the passage of a small stone at the time of the onset of the symptoms. There was some discomfort on urination and some frequency, but otherwise the history was unimportant.

A complete cystoscopic examination was made, and a pyelogram of the left side done. The phenolsulphonephthalein appearance time was seven minutes on each side. The radiographic studies showed "Ptosis left kidney, left hydronephrosis, elongated lower calyx, shadow over symphysis." The urinalysis was negative, and the cultures of all three urines were sterile. This patient was not seen again for one year, at which time she again presented herself, stating that she had felt well since her former visit and that the backache had disappeared. She complained at this visit of dysuria and frequency, pain in the bladder region, and leukorrhea. A complete examination was again made, and this time a pyelogram of the right side was done. The x-ray report on this occasion stated that there was ptosis of both kidneys and right hydronephrosis. Again the functions, cultures, and urinalysis were normal. She did not return for observation for two months, at which time she said that she had just recovered from a hemorrhage from the vagina. She was referred to the Gynecologic Department, and no pelvic lesion was found. She was advised, because of the double hydronephrosis, to attend the clinic at regular intervals for pelvic drainage and lavage. At the end of one year (April, 1926) she had had dilatation of

both ureters up to size ten, and while there was a steady drip from both sides during catheterization, the function of each kidney was normal. During this period she had also been seen by the Medical Department for a cardiac condition which yielded promptly to treatment. She was again sent to the Gynecologic Clinic because of the persistent leukorrhea. The report from this examination was 'Ulceration at meatus, no pus can be expressed from Skene's ducts, urethra thickened, and there is apparently emphysema along the urethra.'

At this time because of the fact that her condition was practically unchanged after having the kidney pelvis treated, and apparently her ptosis and hydronephrosis were no longer sufficient to account for her symptoms it was decided to examine her urethra. On August 3, 1926, urethral endoscopy was done. Upon insertion of the endoscope a gush of thick, creamy pus appeared and in the deeper portion of the urethra a grating sensation was felt transmitted through the instrument as it was introduced. A very markedly congested mucosa was seen, and there was rather free bleeding, but otherwise nothing was learned. In view of the previous report from the gynecologists and the grating felt at endoscopy a slender artery forceps was introduced and a very distinct stone click was obtained. At this visit all the former x-ray studies were reviewed, and much to our chagrin, we were faced with the very obvious fact that the shadows which had been described in the first report as being 'shadow over symphysis' were two urethral stones.

Except to state that on August 27, 1926, she consented to enter the hospital, and that under sacral anesthesia the urethra was dilated, and the stones crushed and removed, no further comment is necessary. The patient is now free from symptoms, and was seen only a few days ago and feels well. All the frequency and dysuria have disappeared, and there is no leukorrhea.

The appended x-ray studies show the stone very distinctly

## NOTES ON CHYLURIA WITH REPORT OF CASE

CHYLURIA is a sufficiently rare symptom in our climate to warrant a brief resume of its causation, and an explanation of the clinical picture presented. Chyle is one of the normal body fluids, has its own circulatory path, and is excreted only in pathologic conditions. Its presence in the urine or any other excretion calls for investigation. Cases of chyluria are on record in the dim past, but the first completely reported instance giving autopsy evidence is that of Stephen McKenzie. In this patient the entire posterior abdominal chain of lymphatics was greatly enlarged, and there was communication between a dilated radicle and the left kidney pelvis. Since that time several writers have seen the condition, but in few have autopsies been possible, because the condition rarely is a fatal one.

Henry T. Bewley<sup>1</sup> classes chyluria under the general grouping of fat in the urine. He states that it (*i. e.* fat) may be found in the urine after fractures of bones in which fat embolism occurs, or in diabetes, in pancreatic disease, and after the ingestion of large quantities of fat. It (fat) may be seen in urine as droplets in Bright's disease, and in the degeneration of tumors of the kidney. Fat may also accompany degeneration of the kidneys due to phosphorus poisoning. In all such instances Bewley calls attention to the fact that the fat is seen as droplets often visible to the naked eye, whereas, in the case of chyluria, he reports that fat was present as a fine emulsion intimately mingled with albumin and fibrin. He quotes C. Bernard and Robin as stating that lipemia may exist, and that the excess of fat is passed out through the kidneys. He takes exception to this belief with excellent reason, and maintains that were it passed through the kidney, fat would be excreted as found in lipemia, as the kidney has no known mechanism for emulsifying fats. He mentions Sir W. Roberts' explanation that the chyle oozes from the inflammatory surface with engorged or blocked lymphatics but apparently does not accept it as a complete explanation. He believes, with Van

Dyke Carter that there must be an abnormal communication between the lymphatics and some part of the urinary passages. He describes 1 case in which a very heavy sediment of chyle was present and the amount was apparently not influenced by food posture exercise or temperature. His patient recovered partly and the chyluria diminished but did not wholly disappear after prolonged rest in bed. Although diligent search was made there were no filariæ found in the blood at any time.

Diamantis<sup>2</sup> cured a patient of filarial chyluria in one month by the intravenous administration of tartar emetic using a total amount of 0.83 gm.

Franz and Stejskal report chyle from both kidneys in their study of a case.

Saxton Pope<sup>3</sup> records a case of five years' duration with normal ureters both visibly excreting clear urine. In this case the chylous urine was easily obtained by pressing the open end of the cystoscope over a sinus plainly seen on the trigone. There were no filaria on two examinations in this patient. As a child this patient had had a tuberculous abscess in the groin with lumbar kyphosis and lower dorsal lordosis. The case passed from observation with no change in the patient's condition.

Henry<sup>4</sup> reports a case in which there was enormous dilatation of the lymph channels in the region of the kidney some being as large as a lead pencil. This patient also had a tuberculous spinal lesion as a child. In this case filariæ were found.

Davis<sup>5</sup> cites a case in which chyle was found in the bladder urine and that from the left kidney but not on the right side. In this patient the chyluria was intermittent and had been present at intervals since her fifteenth year. The chyluria disappeared spontaneously as on former occasions and seemed to occur at moments of great emotional stress. No filariæ were found. The patient was at that time twenty-eight years of age.

Hoge<sup>6</sup> mentions a man with the characteristic urine who was a heavy eater of butter and of an alcoholic tendency. In this patient repeated examinations did not reveal filariæ. The condition completely disappeared on a diet in which fats and alcohol were excluded.

Hertz<sup>7</sup> very briefly reviews 41 cases of non tropical chyluria. He cites an autopsy of Oehme in which there was a cancer of the posterior wall of the stomach but does not insist upon that lesion as the cause, although the chyluria appeared coincident with the gastric symptoms. He also mentions Sir W. Roberts' case of pulmonary tuberculosis in which chyluria was found, but no communication existed at autopsy between the lymphatics and any part of the urinary tract. In this patient, however, the chyluria had disappeared before death occurred. He also quotes Port's studies on a case also with advanced pulmonary tuberculosis in which the chyluria was present for a while but would clear up upon rupture of one of the large bronchial glands. He also cites Osler whose autopsy of a case did not show any dilatation of the lymphatics or obstruction to the thoracic duct. The autopsy on his own case showed thoracic duct obstruction about 7 cm. above the diaphragm. The lymphatics below the receptaculum chyli were found to be dilated, and there was communication between them and the bladder channels. There was a small area in the bladder which was ulcerated and edematous, and this he took to be the site of the sinus through which chyle was delivered into the bladder. He believes that chyluria is always due to thoracic duct or large tributary obstruction, and that in filariasis the obstruction may not be complete until long after the organisms have ceased to be found in the blood stream. From nutritional studies on his patient he found that the maximum amount of chyle was present five hours after eating and that it had almost disappeared in eight hours or was then at a minimum.

Bramwell<sup>8</sup> gives a general clinical review, and concludes that the condition is due to dilated lymphatics and lacteals communicating with some portion of the urinary tract.

Charteris<sup>9</sup> describes a case in which the fully erect posture caused the patient's chyluria to disappear but at any angle greater than 45 degrees the condition returned. This patient was seen over a period of eight years and at no time were filariae found. The urine was most milky when he was flat on his back. There was no exact diagnosis made, but the patient believed that



there was a calcified lymph gland with a pedicle and that it fell against the thoracic duct as the patient reclined. Radiograph studies failed to establish this conclusion and no cystoscopic examination was made.

Hampton<sup>9</sup> cites a case which he asserts was non parasitic in origin. The patient had always lived in the mountainous regions of Virginia and had never lived in the tropics. There were no pulmonary symptoms and the appetite was good. There was no retention of urine and no incontinence but there were occasional attacks of pain when the fibrinous clots of chyle were passed. Both ureters were catheterized and both were free from chyle. No filariæ were found but there was a slight increase in the eosinophils. The fat disappeared under complete starvation. Posture was of no importance. His remarks on the fat percentages are interesting. There was from 0 to 1.8 per cent secreted daily, and transposing this into ordinary diet it represents a loss of about 0 to 50 gm per day.

Carter<sup>11</sup> reports a West Indian mulatto in which the left half of the scrotum was enlarged and felt like varicocele. This he attributed to lymphedema of the spermatic cord. Cystoscopy revealed very cloudy urine from the left kidney and almost clear urine from the right. Salvarsan 0.3 gm given after six weeks of hospitalization caused all chyle to disappear from the urine and after two weeks he was discharged. Carter<sup>12</sup> made a most complete study of the amount of chyle lost. The percentage varied from 0.35 to 1.4 per cent. With an average intake of 66.39 gm of fat per day the average output was 6.45 gm a loss of about 10 per cent of the fat eaten. His case was admirably worked up in great detail. The patient also was relieved of symptoms after the use of salvarsan.

In his text book Charles Lyman Greene<sup>13</sup> states that chyluria is almost pathognomonic of *Filaria sanguinis hominis*.

In *Keen's Surgery* cases of ruptured chylous cysts are reported from Moynihan, Dowd, Rasch and Von Blum. In a personal communication Brinsmade<sup>14</sup> tells of 3 cases of chylous omental cysts discovered at exploratory operation. These were solitary and of considerable size. He believed them to be caused

by local obstruction in the lacteals draining the area, and did not excise them

Lower and Belcher<sup>15</sup> report a case in which there was slight bladder congestion, and the bladder and left kidney urines were milky, while the right urine was clear. There was also a *Bacillus coli* infection in the left kidney. An increase or decrease in the fat intake did not materially affect the amount of chyle. Their patient was treated by neo arsphenamin, and relieved.

In a personal communication Pilcher<sup>16</sup> described a case in which the symptom cleared up after administration of neo arsphenamin. His patient had filariasis.

The following list of causes is compiled from summarizing several reference tables in text books

| <i>Parasitic</i>             | <i>Non parasitic</i>                            |
|------------------------------|---|
| Filariasis                   | Lymphatic aneurysm                              |
| Echinococcus                 | Occlusion of thoracic duct                      |
| <i>Cysticercus cellulosæ</i> | (a) By obstruction                              |
| <i>Ascaris lumbricoides</i>  | (b) By external pressure                        |
| Malaria                      | Trauma including thoracic duct                  |
|                              | Local abscess between duct and other lymphatics |
|                              | Tuberculosis                                    |

A brief summary of the case which fell under our observation showed a young woman of thirty-four, a native of the Virgin Islands, who had noticed that for the previous six months her urine was very thick and cloudy, with heavy white sediment. She had also passed heavy white clots and suffered considerable pain while doing so. She had not noticed hematuria and had no headache. She was able to hold the urine for several hours, and, unless clots were passed, there were no urinary symptoms. She had lost about 5 pounds in the preceding six months, but attached no significance to this, as she had always been slender. There was no cough and, except for the urine, no important symptom. She had had a similar attack about ten years before and had made a very slow recovery, but had been free from symptoms in the interval. Her general physical examination was unimportant, and showed nothing except a very slender,

poorly nourished young woman Urinalysis was unimportant, and in the first specimen sent to the laboratory no chyle was noticed, the only comment made was that there was an excess of granular detritus A twenty four hour specimen was described as cloudy, yellow, slightly alkaline, specific gravity 1021, heavy trace of albumin, no sugar, moderate number of triple phosphates, no pus or casts She was referred to the Urologic Department for cystoscopy

At the first examination the bladder was so filled with clots of fibrochyle that only the bladder neck and a small area of the trigone were visible, and she was admitted to the hospital for further study The urinalysis here showed very large amount of chyle The first cystoscopy was done on November 16 1926, and it was repeated on November 20th, with a somewhat better result, as she had had a bladder irrigation twice daily since admission The clots had disappeared, and the bladder and ureter orifices were clearly visible There was rather general cystitis, and the right side of the bladder appeared somewhat more congested than the left There was a small tumor hanging by a pedicle from somewhere above the right ureter orifice, and the ureter could be entered only after pushing this out of the way This was probably some of the clotted chyle still adherent to the bladder mucosa Both ureters were catheterized, and both were entirely free from chyle

On November 23d a cystogram was taken, but showed no sinus tract This is perhaps to be expected as the sinus would not have to be of very large proportions to allow the passage of a fairly large amount of chyle if the pressure from above were sufficient On November 30th she was again cystoscoped and the bladder was much improved The tumor noted in the previous examination had disappeared, and at this time the left side of the bladder was much more congested than the right There was an area of edema and congestion, about 5 cm in diameter, above and internal to the left ureter orifice, and over the trigone There were some shreds of clot still adherent in this area, but no flow of chyle could be demonstrated, although it was eagerly looked for On December 7th very similar find

ings are recorded, the amount of adherent clot had lessened at the edematous area, and the latter was less congested.

As far as we were able to determine, there was very slight effect from withholding fats from this patient's diet, although there was some diminution on a fat-free diet. Posture, exercise, and heat and cold had no effect. There were several attempts to find filariæ and all were unsuccessful. The Wassermann was negative. The blood-picture was normal except for 5 per cent. eosinophils and a slightly lowered hemoglobin (70 per cent.).

On December 8th, the day following her last cystoscopy, there was still the usual amount of chyle present in the urine, and she received neo-arsphenamin, 0.6 gm., intravenously. Aside from a rather severe chill several hours later, with a little headache and nausea, there were no untoward effects. On December 9th her urine was, for the first time, almost clear, and on the 11th became completely so. She received another injection of the same dose on December 15th, and was discharged on the following day free from symptoms.

She has since been seen at the follow-up clinic, and on January 13, 1927 she was again cystoscoped. At this time her bladder was perfectly normal, and the mucosa was clean and free from any adherent mucus. The ureter orifices were normal. At the site of the edema noted in previous examinations there was a thin, white, glistening line, similar to the old scars sometimes observed after cystotomy, which was interpreted as the healed site of a sinus communicating between the abdominal lymphatics and the interior of the bladder.

From a review of a rather limited literature on the subject it may be concluded that chyluria must always result from a communication between some portion of the thoracic duct and its tributaries, and the urinary tract from the kidney pelvis to the bladder. Such communication may be parasitic in origin, the result of inflammatory changes, or coincident with new growths. The pressure developed within the thoracic duct may arise from obstruction within or from the encroachment of tumors from without, and, the engorged vessels being thin walled and not designed to withstand pressure, rupture follows.

While chylothorax and chylous ascites are probably more common than chyluria it is conceivable that any cause which produces them if it produce pressure against the lymphatics of some part of the urinary tract, is adequate to produce chyluria. Filariasis is, in the tropics the most frequently encountered cause of lymphatic obstruction but other parasites have been reported.

While in this instance there were no *filariæ* found it seems as though this or some other parasite destroyable by intravenous neo arsphenamin was responsible for the condition. Where a parasitic origin is proved or suspected, some form of arsenic seems indicated either tartar emetic or arsphenamin. In those cases in which inflammatory changes or new growths are responsible, the cure of the condition must be based on the anatomic lesion present.

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## URETEROCELE

URETEROCELE is one of the less commonly encountered abnormalities of the urinary tract, yet it is seen with sufficient frequency to warrant as complete a study of its diagnosis and management as possible.

The lesion appears as a rounded protrusion at one or other of the ureter orifices and occasionally at both. The protrusion may be of comparatively small dimensions but may be large enough to occupy a considerable portion of the bladder. Expansion and contraction with the rhythm of ureter peristalsis may be observed and a jet of urine may be seen coming from a pin hole orifice. Or the orifice may be hidden on the posterior aspect of the tumor and no urine visible. The membrane covering the ureterocele may be pale and glistening in appearance or it may be reddened, with dilatation of the smaller vessels and give the impression of a moderate degree of inflammatory reaction. Rarely the contractile movement is very slight and may be overlooked.

The older writers assigned two principal origins of ureterocele, a congenital stenosis of the lower end of the ureter being the first choice and of lesser importance inflammatory contraction of the ureter meatus.

In the literature of the past five years several case reports have appeared and a better understanding of this condition has been brought about from the resulting discussion.

Aschner<sup>1</sup> describes a case in which the condition was bilateral. He used fulguration to destroy the sac, and achieved a complete cure of his patient. He records that his patient had large patulous orifices with normal functional ability at a subsequent examination.

Kretschmer<sup>2</sup> reports a case in which the sac contained a stone. He was unable to find the ureter orifice because of its position behind the mass, and attacked the condition through a cystotomy,

giving his patient complete relief by excising the tumor with its contents

Michel<sup>3</sup> reports 1 case with a resume of the literature. The patient did not submit to treatment and trace of him was lost. In his summary he favors Fenwick's theory of a congenital narrowing of the ureter meatus with later dilatation of the intramural portion from renal pressure.

MacAlpine<sup>4</sup> reports a case with a mass the size of a pigeon's egg in which the symptoms were dysuria, pollakiuria and hematuria. Complete relief of all symptoms followed removal of the mass through a cystotomy. Pyelography afterward showed a minor degree of dilatation of the renal pelvis on the same side with clubbing of the calices.

Roberts<sup>5</sup> draws a distinction between true ureterocele in which the ureter orifice is contracted and hernia of the ureter in which the ureter orifice is dilated. He believes there is some degree of hydro- or even of pyonephrosis in all the more severe cases. In the female he describes the possibility of the mass protruding through the urethra and giving rise to great discomfort.

Romane<sup>6</sup> gives the history of a female patient whose ureterocele was the size of an English walnut. This is the only record outside of the present series where radiographic studies of the condition are submitted. He treated his patient by open operation and obtained a complete cure. His reasons for preferring operation to fulguration are as follows: (a) The size of the cyst; (b) the necessity for repeated fulguration; (c) the resulting ulceration; and (d) the fear of contracture at the site of the fulguration scar.

Petillo cites 4 cases and admirably reviews the causes. He completely discards the congenital theory and very adequately defends the acquired nature of the condition. He explains the progress of the ureterocele as resulting from stasis following muscular paralysis occurring where infection has caused nerve block.

Thomas and Mellon<sup>7</sup> quote Lavandera, who reviewed 64 cases published and give as the principal cause the failure of the lower end of the lumen of the renal bud as it joins the bladder.

In a very recent article Brown reports a case in which fulguration was completely successful, and examination of the kidney function later gave normal function and clear urine from the affected side.

There are 7 cases in the present series and no two are quite alike either in symptomatology or the degree of enlargement. They are offered principally to illustrate the radiographic diagnosis with the exception of one case, in which none was possible or necessary. The information obtained by the x ray sheds very definite light on the development of ureterocele and further substantiates the acquired nature of the condition.

Case I—G P male age twenty complained of frequency, dysuria, occasional slight hematuria. He had recently lost



Fig 475

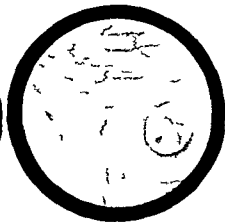


Fig 476

Fig 475—Very large mass which appeared to occupy almost half of bladder. This patient was treated by open operation and nephrectomy on affected side was necessary later because of advanced infection.

Fig 476—Cystoscopic appearance of ureterocele later treated by fulguration with complete disappearance. No damage to function of kidney. All symptoms relieved.

weight and thought that at times he was feverish. On admission to the hospital he passed with great discomfort small quantities of foul smelling urine. Cystoscopic examination revealed a large mass, inflamed and almost filling the left half of the bladder. The ureter orifice was not visible and catheterization of the left



kidney was impossible. No attempt at fulguration was made in this case and cystotomy was advised. The sac was incised and the redundant tissue removed and the cut edges whipped over with catgut to prevent their growing together again. While the operation was very simple and gave every evidence of being successful this patient had a very stormy after course and a very slow convalescence. The bladder wound was very long in healing, and the symptoms of frequency and dysuria remained. A left nephrectomy was necessary before he was restored to health (Fig 475).

Case II—F M female thirty two years old non parous married with no evidence of pelvic inflammation. She had complained of lower left quadrant pain recurring at intervals with



Fig 477 —Rad ograph showing dilatation of ureter w thin bladder

increasing severity during a period of two years. Frequency and nocturia were present, although no blood was ever noticed

Cystoscopy revealed the characteristic mass, with a moderately reddened mucosa. The pyelo-ureterogram showed this case very well. Although there was no evidence of renal damage in this picture, there was abundant pus in the urine from the affected side, and she had had occasional pain in the left renal region. At first dilatation with ureter bougies was tried, but this failed to give relief and we resorted to fulguration. A wide lane was burned deep into the tissue for about  $\frac{1}{2}$  inch in length, ending at the contracted ureter orifice and passing through the wall of the sac, but sparing the underlying base of the ureter outlet. There was prompt relief of all symptoms, and cystoscopy three months later showed a normally acting ureter orifice with a somewhat dilated meatus. Kidney function normal, and freedom from all symptoms (Figs 476, 477).

Case III.—B. B., young female, twenty-three, single, non-parous, and no history of pelvic infection. Her symptoms were



Fig. 478 —Poor reproduction of excellent radiograph. The outline of the ureterocele in bladder area has been intensified.

pain in the left kidney region, radiating to the shoulder. No urination symptoms. She showed a somewhat smaller mass than either of the previous patients, the ureter orifice being merely somewhat elevated, and the opening contracted. Her pictures clearly show a more advanced dilatation of the intramural ureter than was visible through the cystoscope. She was relieved by simple dilatation with the ureter bougie (Fig. 478).

Case IV—J. C., male, twenty six years. Complained only of pain on the left side and in the left kidney area. No urina-



Fig. 479—The radiograph was less definite than the cystoscopic picture

tion symptoms. Small ureterocele shown by ureterogram and a stricture of the ureter also. There was immediate cessation of the backache after passing the catheters and no further return of the condition. Not fulgurated (Fig. 479).

**Case V.**—B T, female, thirty seven years Three months previous to admission she had consulted one of the younger members of the clinic for pain in the right kidney region A flat x ray showed a slight enlargement of the right kidney and medical treatment was given As no improvement followed, she came for more complete study Ureterogram showed a distinct clubbing and enlargement of the lower end of the right ureter In this case the cystoscopic evidence alone would hardly have warranted anything more than passing notice with some comment as "ureter orifice tight," or "ureter orifice considerably elevated" Had the x-ray not clearly demonstrated the very definite sacculatation of the intramural ureter this diagnosis would have been overlooked This patient also had complete relief after simple dilatation with bougies

**Case VI**—Male, twenty four years This patient was admitted with all the symptoms of typical renal colic, beginning about one week before coming to us He had severe right sided pain hematuria, and dysuria He denied having passed a stone Cystoscopy and x ray showed the characteristic picture The right ureter orifice was raised, edematous, and definitely inflamed Pus and microscopic blood were obtained from the right kidney and *Bacillus coli* was present Within twenty four hours after the catheter was passed he experienced total relief from his symptoms, and was discharged at his own request

**Case VII**—C B, female, age fifty two This patient gave only pain and backache as her symptoms and was relieved wholly by the use of dilatation (Fig 480)

It is apparent that in some cases of ureteroceles the condition may be a very mild one with few, if any complications There is no one symptom diagnostic of the lesion Frequency, dysuria hematuria, and sometimes strangury are the urinary disturbances mentioned, although none may be present Other patients describe only backache or pain along the course of the ureter If the ureterocoele itself is not acutely inflamed, the reaction in the bladder may be slight, and only such symptoms as would arise

from pressure from below against the kidney pelvis would be noted

In the earlier stages of ureterocele it appears from our results that the condition is comparable to contracture at any other portion of the ureter. There is here a strong likeness to ureter stricture, with the site of the narrowing at the meatus, and the dilatation within the bladder, where the bladder musculature



Fig. 480 —Early development of condition not fulgurated. Relieved by dilatation of ureter orifice

does not exert sufficient support and is unable to compensate for the obstruction by hypertrophy and the sacculation results

As to therapy it can be seen that the indications vary. Our first case was advanced beyond simple loss of tone, and there was definite back pressure on the kidney with a destructive effect on the renal tissue, necessitating removal of the kidney before the patient recovered. The second instance was advanced, but had not caused irreparable damage to the kidney, as the later

course of the patient showed. In the remaining cases it was not required to do anything but simple dilatation of the ureter orifice, including stretching of the ureter at the same time.

In view of our increasing knowledge of the ureter and its pathology, it seems reasonable to deduce that the congenital factor plays little if any part in the development of ureterocele, but that the dilatation here is of the same nature as dilatation in any other part of the ureter.

In conclusion, it may be safely said that ureterocele is

A. Acquired as the result of local infection below the dilatation.

B. Associated with ureteritis and may be accompanied by pyelitis, hydronephrosis, or pyelonephritis.

C. Curable in the milder cases by dilatation of the meatus and ureter.

D. Curable in the more advanced cases by destruction of the sac with the high frequency cautery.

E. Occasionally severe enough to demand nephrectomy where destructive effects are well advanced in the kidney.

F. Capable of accurate diagnosis by pyelo-ureterography when the cystic enlargement within the bladder is of comparatively lesser degree.

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## TECHNIC AND INDICATIONS OF BLOOD TRANSFUSION

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DENTER DAVIS

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ABOUT five years ago a transfusion team was appointed at this hospital. After a careful study of the different methods, the Lindeman technic was adopted because of its simplicity and flexibility. Since that time there have been approximately seven hundred and fifty transfusions without a death, and the reactions have been slightly less than 3 per cent. In only 2 cases were the reactions alarming; one, a boy suffering from purpura, had eleven transfusions. On the day of the last one he had an injection of horse-serum just before the transfusion. Whether this accounted for the reaction cannot be determined. The other was a woman with pernicious anemia, and at the end of the first syringe injection she complained suddenly of back pain, became cyanosed, and urticarial spots developed. The transfusion was stopped and then adrenalin injected. She recovered. A cross-matching of the donor and recipient was again done, and gross agglutination followed. There had been a clerical error in the report, or an inexperienced person had done the matching. We think we have Dr. Nerb, our bacteriologist, to thank for the excellent results we have had, for it has only been through his careful laboratory supervision that we can report such a low morbidity.

Where we did have reactions, they usually followed when our technic was faulty, and we believe they were due to clot formation in the needles—the clots gaining access to the blood-stream. The higher percentage of reactions obtained with the various two-way valve methods may be explained on the basis of this clot formation. The caliber of the rubber tubing used is many

\* Deceased.



times larger than the caliber of the needle. This increases the incidence of clot formation along the sides of the tubing. We recognize that incompatible white blood cells and the existence of other blood types than the customary four groups may account for some of the unexplainable reactions where typing and cross matching showed compatibility between the blood of donor and recipient but the fact remains that reactions are more frequent with the two way valve methods than with the Lindeman method.

### TECHNIC

Our technic is the same essentially as that devised by Lindeman except that we have added one factor of safety to the donor in sepsis cases where there is the possibility of the recipient having a positive blood culture. In these cases there is a no contact technic used between donor and recipient. The surgeon with drawing the blood from the donor drops the syringe on the table and after the blood is injected the second member of the team discards the syringe. Of course there are separate instruments used for donor and recipient.

In our technic we have found four devices worked out by Dr Morgenthauer very useful.

**1 Aluminum Arm rests for Donor and Recipient**—These are made of sheet aluminum long enough to hold the arm and extend entirely across the patient's back the weight of the back anchoring the arm end. The end which fits under the back is flat while the arm end is curved to prevent the arm from slipping off. The region where the elbow rests has an upward bulge 2 inches high and 4 inches square. This bulge keeps the elbow well extended and gives good vein exposure. The sides of the arm rests leave a  $\frac{1}{2}$  inch turn under to strengthen the aluminum sheet and prevent bending. The latter is further prevented by the curved arm end. These arm rests are light simple strong and substantial and can be adjusted to any degree without special attachments on the table.

**2 Arm Sleeves for Donor and Recipient**—These are made to fit any arm and have a blind distal end while the proximal end flares out to cover the chest. At the elbow region there is an

opening about 6 inches long and 3 inches wide, through which the veins are easily accessible. Before applying the arm sleeves a small sheet is placed over the arm rest, and with the patient's arm raised the arm sleeve is put in place. By the use of the arm rests and sleeves we can keep our operating field clean, and we are not bothered by slipping towels and sheets.

**3 Donor Needle with Stop-cock**—Some have raised the objection to the Lindeman method that considerable blood is lost during the connecting and disconnecting of the syringes to the needle of the donor. We have overcome this by having a stop-cock fitted to the end of the donor needle. After connecting the syringe to the needle the stop-cock is opened and then closed before disconnecting thus preventing loss of blood. This stop-cock donor needle is especially useful for the larger transfusions. In all other respects our technic follows that of Lindeman. The adjustment of the tourniquet is very important, in fact where failure results, the cause is often due to an improperly adjusted tourniquet on the donor's arm. To get the maximum flow of blood, a very essential factor, only enough pressure should be applied to stop the venous return without affecting the arterial flow.

**4 Tourniquet with Spring**—This tourniquet is made of ball chaining and two sliding pieces of metal, the latter being fastened by a spiral spring. The ball chaining is attached to the distal end of one piece of sliding metal. The chaining is placed around the arm drawn taut, and, when the desired tension is obtained the ball nearest the proximal end of the other metal piece is placed in a notch in that piece. By drawing up or letting out one ball at a time, various adjustments are possible. This ease of adjustment has been found very useful in the larger transfusions where the donor's blood pressure may vary from time to time, making it necessary to readjust the tourniquet to get a better flow of blood. The spring gives elasticity to the tourniquet. Professional donors have stated that this all metal tourniquet gives less discomfort than rubber tubing. The tourniquet is simple, compact, easily sterilized, does not pinch the skin, and lasts indefinitely.

## DONORS

We are now using when possible non professional donors. We find it more economical and more agreeable for the patient and we think better and healthier blood is transfused than in the utilization of anemic, ghastly looking professional donors. At times it is more difficult to get into the veins of a non professional donor but here we find that the flexibility of the Lindeman method helps out. A Wassermann blood test is made on all donors except in cases of urgency. In these urgent cases the donor is first questioned as to possible luetic infection and quite frequently we have given to the recipient 6 decigrams of neo salvarsan in 20 c c of distilled water after the transfusion. A luetic history precludes the use of that donor. The blood of the donor and recipient are grouped and then cross matched in all cases.

## AMOUNT OF BLOOD

The amount of blood transfused is very important. We now have blood pressure readings on all recipients during the transfusion. Two cases will illustrate. The first was one of long standing pyloric stenosis who we thought required a large pre operative blood transfusion and 1000 c c of blood was given. He had no reaction but for the following three days complained of a feeling of warmth all over the body and a fulness in the head. Too much blood was transfused and had his vessels been sclerosed a cerebral hemorrhage might very readily have resulted. Blood pressure readings would have helped in determining the amount of blood to give this patient. The second case was one of severe postpartum hemorrhage. She was given 500 c c of blood with temporary improvement. About six hours later the patient became worse in fact almost moribund. Another transfusion was given during which blood pressure readings were taken. At the start her systolic blood pressure was unobtainable and remained there until 750 c c of blood were transfused. From this point the pressure slowly rose to 120 at which time 1300 c c of blood had been given. This patient was small and since she had 500 c c of blood at the first transfusion we would have stopped the second transfusion after giving 750 c c had

pressure readings not been taken, mainly because we had used the same donor, her husband for both transfusions, and it is questionable whether or not this amount of blood would have saved her. She made an uneventful recovery.

### TRANSFUSIONS IN NEWBORN

In newborn infants, where transfusion is indicated, we use the arm or leg vein in preference to the longitudinal sinus. It is much safer, but the technic is more tedious. We use an 18 or 19 gage, long hypodermic needle, with the point filed off, making a cannula of it. The wire is passed through the lumen of the needle to the exact end, thus making a stylet. After the vein is exposed, a 10 inch length of very fine silk thread No. 00 is passed through its walls, using a No. 12 sewing needle. A slanting, downward incision is made into the lumen of the vein about  $\frac{1}{8}$  inch below the silk thread. Very small, sharp pointed scissors should be used to make this incision. The 18 gage needle is now passed into the vein. Slight upward traction on the silk thread raises the flap made by the incision and materially helps in passing the needle into the lumen of the vein, the most difficult part of the operation. The needle is now held in place by a fine ligature tied around it and the vein. A piece of 8 inch rubber tubing is connected with the needle by means of a coupling, another coupling is tied in the distal end of the tubing to fit a 20 c c. record syringe. In this fine needle the blood will clot rapidly, therefore the technic must be smooth, rapid, and perfect. If trouble is experienced, citrated blood may be used. The object of the rubber tubing is to take up the jarring of connecting and disconnecting the syringe as the fine vessel walls are easily penetrated. The usual amount given to a newborn baby is 50 to 100 c c. We have given as much as 250 c c. in a severe case of hemorrhage following a rabbi circumcision.

### INDICATIONS

Without being specific as to conditions or diseases, it may be said that transfusion is indicated in any case where there is an

anemia sufficient in any way to lower the resistance of the patient

As early as 1872 Leisrunk said that transfusion was indicated in all those pathologic conditions in which the blood is so altered in quantity and quality that it is unfit to fulfil its physiologic duties. Upon the word physiologic hinge, the answer to the indications for transfusion so let us consider briefly what transfusion does and the physiology of the factors entering into these actions. It accomplishes three distinct actions

1 Millions of red cells are added which of course increase the oxygen carriers

2 The blood vessels are filled with a medium that is viscous and of normal consistency

3 The blood forming centers in the body are stimulated

We little realize how much oxygen a patient receives from a transfusion. An illustrative example as worked by Feinblatt<sup>1</sup> will serve to bring this clearly before you. Given a patient weighing 130 pounds. Under normal conditions her blood volume would probably occupy about 5 liters. Assume that as a result of blood dyscrasia her blood volume is reduced to 75 per cent of the normal and the red cell count to 40 per cent of the normal. In that case her oxygen carrying capacity so far as the red blood cells are concerned would be reduced to 30 per cent of the normal— $0.75 \times 0.40 = 0.30$ —or to the equivalent of  $1\frac{1}{2}$  liters of normal blood. Under such conditions the addition of 500 cc of blood from a healthy donor would constitute an increment of oxygen carriers approximately equivalent to one third the number already possessed by the recipient.

The value from this standpoint is then self evident. The stimulation of the blood forming centers by the donor's red cells broken down soon after transfusion is not the real benefit derived from transfused blood but that stimulation is derived by the quantity of blood and the added volume of functioning red cells. We do not believe the red cells are broken down in the recipient. Ashley has shown this idea to be erroneous inasmuch as he has demonstrated that the transfused corpuscles in the

<sup>1</sup> Feinblatt Blood Transfusions

blood of the recipient exist for periods of over thirty days. In some cases of pernicious anemia the red cells have been found in the circulation of the recipient for one hundred and thirteen days.

The fate of the white cells is as yet unknown. Whether the white cells remain in their transfused state, or whether the white cell count is increased or decreased after transfusion is not generally known. This is one reason why we are somewhat in the dark as to the value of transfusion in sepsis.

With these factors in mind as regards the red and white cells, the indications for blood transfusion have been grouped according to their value as measured by end results in the analysis of over 500 cases of transfusion by the direct or Lindeman method. We have attempted to be as brief as possible under each indication, and where no definite results were obtainable have so stated.

**1 Hemorrhage**—Sudden losses of blood from any cause. This indication is self evident, as the transfusion replaces the blood loss and furnishes the necessary oxygen carriers.

**2 Surgical Shock**<sup>1</sup>—"Surgical shock is associated with a low systolic pressure, the capillaries become engorged with blood, and the capillary lining cells rendered porous, due, it is believed, to the action of some unknown toxin. The blood transudes through the walls and into the surrounding tissue spaces. More plasma than cellular elements escape, thus rendering the blood more concentrated and at the same time a diminution in the blood volume, leaving an insufficient amount of blood to maintain normal heart action. The transfusion should be promptly done and not after shock has supervened for hours and had an opportunity to damage the vital centers, and enough blood should be transfused to bring the systolic pressure up to 120 in order to re establish circulation in the capillary area. Theoretically, gum acacia solution holds a place in the treatment of shock because it fills the vessels and does not permeate the vessel walls quickly, while its viscosity raises the blood pressure. However, it is not without danger, and since the toxic theory of shock is accepted, blood should be the fluid of choice. Further-

<sup>1</sup> Feinblatt: Blood Transfusions

more it has been shown that the imperfect oxygenation in the tissues associated with shock results in shift of the medium toward the acid side, in which case the addition of normal alkaline buffers of blood are of appreciable value'

**3 Preoperative Cases in Which There is a Secondary Anemia**—This group deals with what we term the 'poor risk' due to lowered number of red blood cells and low hemoglobin. Here it is a prophylactic measure and converts many a questionable risk into an absolutely safe one. It is also indicated in the preoperative management of jaundice not controlled by other measures.

**4 Hemorrhage of the Newborn**—One transfusion usually allays hemorrhage. One-hundred per cent in these cases.

**5 Illuminating Gas Poisoning**—Here we have the hemoglobin of the red cells combining with the carbon monoxide as carboxyhemoglobin is more stable than oxyhemoglobin. The affected cells are lost to the individual. Replacement of these cells is then the indication.

Berneister in 1916 in a series of experiments on rabbits and dogs poisoned with coal gas showed that recovery took place in 75 per cent of the cases when transfusion of living erythrocytes was employed whereas nearly all the control animals died.

**6 Blood Dyscrasias**—Under this heading we list pernicious anemia, the leukemias and so-called secondary anemia.

Pernicious anemia is a fatal disease. There is no known etiology and no known cure. It is a disease of remissions and we have no evidence at present which indicates that transfused blood aids to cause a remission.

The disease is progressive and end results do not justify the procedure. Cases on record of patients receiving from 85 to 113 transfusions over a period of two or three years would indicate the truth of this. It seems more reasonable to believe that with the advent of the high purin diet in these cases plus exposure to sunlight and air this form of treatment will be of more avail.

Transfusions in the leukemias are very unsatisfactory.

In the so-called secondary anemias transfusion is a valuable

adjunct to treatment the main line of therapy being devoted to the causative factor

7 **Chronic Hemorrhagic Diseases of the Blood**—(a) *Hemophilia*—Transfusion is specific to stop the bleeding, but a temporary remedy, and is of excellent value where surgical intervention is necessary in a hemophiliac

(b) *Purpura Hemorrhagica*—Opinions here are very conflicting but it narrows down to the fact that, in the early stages, a temporary relief is experienced

(c) *Jaundice*—Here again the reaction of transfused blood is temporary, and as already stated, of value for preoperative preparation of the patient

8 **Sepsis**—Here we have met with a certain measure of success There is, without doubt some antibody response after immunotransfusion or immunized donor In general however in sepsis our chief aid is to combat the anemia, and whenever the patient arrives at a satisfactory point where the battle between the host and the invading organism hangs in the balance, we certainly can increase his resistance to the disease

In the acute infections its results are unfavorable except in the pneumonias Here, it seems to have a detoxicating effect

These, in general are the more common indications for blood transfusions Literature abounds with other indications such as puerperal sepsis, appendicitis empyema bacteremia measles diphtheria diabetic coma nephritis etc Its value has not been proved in these conditions and we should hesitate to use it like a shotgun prescription

This review is a plea for early transfusion in indicated cases and we feel that it should never be used as a therapeutic gesture By this I mean the case that has received every therapeutic measure for the existing disease, and when all else has failed and the patient is moribund, he is given a transfusion, with the result that it is a mere spectacular climax and of no avail

Blood transfusion is one of the most useful therapeutic measures known today It is an indispensable procedure and, as a prophylactic measure against questionable risks, is of inestimable value in reducing the mortality and, with the indications ever



before us, it should be in more general use in surgery as well as in obstetrics and internal medicine

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## A METHOD OF PROMPTLY IDENTIFYING *BACILLUS* *AËROGENES CAPSULATUS* (*B. WELCHII*)

LOUIS NERB

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IN surgical cases developing a gangrenous or emphysematous lesion it is imperative to identify, in as short a time as possible, the flora of aërobic and anaërobic bacteria. The most important organism in these cases is the *Bacillus aërogenes capsulatus* (*Bacillus welchii*), commonly known as gas bacillus. The great handicap is the long process required to identify this anaërobe. Our aim has been to shorten as much as possible the time required to prove the presence of *B. welchii*.

It may be of interest to review briefly the original text-book method. Material from the suspicious lesion is emulsified or ground up in a sterile mortar with sterile broth, and 1 c.c. of this emulsion is injected into the ear vein of a rabbit. Three minutes after the injection the rabbit is killed and placed in the incubator, where it is allowed to remain for about eighteen hours. Positive cases show the corpse of the rabbit abnormally distended with gas. Inserting a trocar into the abdomen, the gas is collected in tubes and, when brought in contact with the flame, explodes on ignition with a typical "hydrogen bark." The autopsy of the animal will show the muscle tissues rather pale and friable, the liver riddled with gas bubbles and having the appearance of a rubber sponge. Smears taken from the bloody peritoneal exudate, from the liver, and from the heart's blood, stained with the regular Gram and Hiss capsule stain, will show the presence of *Bacillus welchii*. However, this test is not very reliable, since it does not prove with certainty that the *B. welchii* came from the suspicious material, inasmuch as this anaërobe is frequently found in the intestinal tract of the animal.

Cultures of the original emulsion are made parallel with the injection of the animal. Aerobic cultures are made on agar plates and broth to discover the presence of the ordinary flora. The anaerobic cultures are made in large agar tubes using the Wright's pyrogallic acid method. Positive cultures show typical gas bubbles in the solid media together with whitish colonies of *Bacillus welchii* 1 to 2 mm in diameter in biconvex or lenticular masses. Smears taken from these colonies show the characteristic morphology of *B. welchii* identical with those found in the rabbit.

With this procedure at least eighteen hours are required to discover the presence of *Bacillus welchii*. To identify morphologically the presence of *B. welchii* in direct smears is practically impossible as many of the other anaerobes are under certain conditions almost identical in appearance with *B. welchii* especially the anaerobic bacillus known as *vibrio septique* which is the same as 'bacillus of malignant edema'.

In the attempt to shorten the time guinea pigs were used for experimental animals. There were found very satisfactory for this purpose and are much cheaper than rabbits. Live cultures of *Bacillus welchii* were injected into the livers of 5 guinea pigs. The pigs were killed within three minutes after the injection by breaking their necks and were placed in the incubator. An autopsy was performed on the first pig after three hours and then on the others at intervals of one hour.

Smears were taken from the liver, peritoneal fluid and the heart's blood of each animal and anaerobic cultures made. The *Bacillus welchii* could be easily discovered even in the heart's blood of the first pig killed. Therefore it was proved that the *B. welchii* can be identified within three hours. Macroscopic lesions on the dead animal are barely noticeable whereas if the animal is left in the incubator for about twelve hours the lesions produced are extensive. The subcutaneous tissues and abdominal muscles are sodden and friable and of a rose-pink color (the so called boiled rabbit appearance). Generally there is no marked edema but slight gas formation. When performing the autopsy a peculiar sour smell is noticeable. After twelve

hours the skin of the pig may be partially digested as a result of which the hair drops off at the slightest touch. Animals killed at the same time without being injected and put in the incubator for the same period of time showed none of these characteristics.

To check up our experiments animals were injected respectively with sterile saline, different strains of staphylococci, streptococci and *Bacillus coli* (communior and communis). The autopsies were made at exactly the same period of time as on the first batch of animals, that is the first one after three hours and then at hour intervals. In none of the animals could the *Bacillus welchii* be found, neither in direct smears nor by checking it up with anaerobic cultures.

The next batch of guinea pigs were injected with a known live culture of *Bacillus welchii* mixed with a fresh culture of *Bacillus coli*. The bacteria were counted by comparison with the red blood cells, applying the vaccine technic. The concentrations of the bacteria were 100, 1000 and 10 000 organisms per c.c. The pigs were injected in the liver with these dilutions, killed immediately, autopsies started after one hour, and then after intervals of one half hour. The identification of *B. welchii* was not very successful in pigs on which autopsies were performed in less than two hours. After two hours the *B. welchii* could be easily seen in the smears taken from the liver, the peritoneal fluid, and from the heart itself. Pure anaerobic cultures of *B. welchii* were obtained in this experiment. The number of organisms was most numerous in the bloody peritoneal fluid. Therefore, by twisting the needle and rupturing some of the liver tissue, producing considerable trauma, a more bloody peritoneal exudate was obtained and the *B. welchii* more numerously produced.

By this experiment the presence of *Bacillus welchii* may be definitely proved within two hours. To verify the results by an accurate culturing method milk was found to be very satisfactory.

Fresh milk was brought to boiling point, and then rapidly cooled to expel the oxygen. The milk was transferred to long test tubes ( $6 \times \frac{3}{4}$  inch) and filled with about 4 inches of milk.

Several tubes were emulsified with the suspicious material and put in a water bath for twenty minutes at 80° C to kill all the vegetative organisms. The tubes were sealed with Wright's pyrogallic acid method and put in the incubator. In some cases even within four to five hours gas bubbles were noticed in the milk, and a positive culture could be easily recognized after twelve hours. Such a culture showed a characteristic stormy fermentation in the milk. The casein was separated floating in almost clear whey being torn and riddled by gas bubbles. Upon removing the cotton plug a slightly sour odor similar to the odor of butyric acid was noticeable. A smear from the clear whey revealed mostly the large encapsulated bacillus of Welch in pure culture. A hanging drop showed large non motile bacilli either single or in pairs. On several occasions a large only slightly spongy coagulum of the milk was observed and although it revealed the presence of *Bacillus welchii* the growth was very scanty. On investigation it was found that all the oxygen of the milk had not been expelled, which was detrimental to the growth of the anaerobe. For this reason special care has to be taken that the process of heating and cooling is done in the shortest time possible.

This method of culturing can be used for the differentiation of *Bacillus welchii* and the anaerobic bacillus *vibrio septique* or bacillus of malignant edema. This latter type of anaerobe grows under practically the same condition as *B. welchii* except that it does not show the violent explosion in the milk but forms an almost solid coagulum in the clear whey. A hanging-drop preparation will show a rather thin rod shaped bacillus having a tendency to form chains and having a slight flexuose and serpentine motion.

This culturing method is very satisfactory because it is more reliable than the agar cultures shows more definite characteristics and shortens the time at least a few hours.

The method is as follows. Suspicious material is emulsified with sterile broth 1 c c of which is injected with a hypodermic syringe and 20 gage needle into both lobes of the liver of a guinea pig twisting the needle to produce trauma. Part of the

emulsion is cultured in milk, as described. The guinea pig is killed by breaking the neck, without producing unnecessary trauma, and placed in the incubator. The guinea pig is autopsied after two hours, and smears taken from the peritoneal fluid, the liver, and the heart. In positive cases the *Bacillus welchii* can be easily seen. A Gram and Hiss capsule stain is made. The morphology of *B. welchii* is peculiarly characteristic. It is a short and stout bacillus frequently showing a halo or capsule around the bacterial body. Both ends are rounded. Hanging drops prepared from the milk cultures show the bacillus absolutely non motile, and strongly Gram positive. It occurs most frequently in pairs, and less often as short chains. Normally spores are not formed.

Results show 97 per cent positive findings in animals after two hours, checked by the positive anaerobic milk cultures. This slight difference may be explained by an error in technic, inasmuch as the animal inoculations were not always made by the same person.

In conclusion, it may be said that the presence of *Bacillus welchii* may be positively proved within two hours after receiving the suspicious material and it can be definitely checked up with the anaerobic milk cultures.

This method is also excellent in the isolation of *Bacillus welchii* from the intestinal flora.



## HYPERNEPHROMATOSIS SECONDARY TO ADVANCED PYONEPHROSIS

N P RATHBUN

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THIS case is presented as being of particular interest because of what appears to be an unusual sequence of pathology

The patient was a colored male, age thirty seven years First seen in January, 1926 One month ago he had chills and fever accompanied by pain in left loin and frequency of urination He had one attack of gonorrhea ten years ago which he thinks was cured Previous history otherwise negative

His fever subsided promptly, but the frequency of urination persisted as did also a dull ache in the loin

General physical examination was negative except for large left kidney, which was easily palpable and definitely tender The urine was very cloudy and loaded with pus Cystoscopy was difficult and unsatisfactory because of the difficulty in getting a clear medium and because the bladder mucous membrane was covered with strings of tenacious mucus Neither ureter orifice was identified Following the instrumentation he developed an acute epididymitis When this had subsided he was again cystoscoped, with much the same result He was referred to the Outpatient Department for bladder irrigation He was kept under intermittent observation throughout the year, during which time his symptoms continued, except that the urinary frequency was somewhat improved, but there were several attacks of very severe pain referred to the left loin, which required large doses of morphin for their control He was cystoscoped on several occasions, with no better result, and on one or two occasions developed an exacerbation of his epididymitis Guinea pigs were inoculated on two occasions, and at autopsy showed no evidence of tuberculosis Radiographs were nega



tive for calculus but showed what appeared to be a very large left kidney

Finally, in December, 1926, with the aid of indigocarmin intravenously, it was possible to recognize and catheterize the right ureter. The right kidney was normal and the phenolsulphonephthalein elimination was normal. A diagnosis of left pyonephrosis was made and nephrectomy advised.

*Operation* (December 11, 1926) —A very large kidney was found densely adherent to all the surrounding structures and was delivered with great difficulty. There was a dense mass of what appeared to be inflammatory exudate about the vascular pedicle which rendered the identification of the separate vessels impossible. A large clamp was placed on the pedicle, and the kidney removed. On attempting to apply a suture ligature, the clamp slipped and there was considerable bleeding which was promptly controlled by the reappliance of the clamp. In view of the fact that the operation had been difficult, and rather prolonged and that the patient showed some signs of shock, it was deemed wise to make no further effort to apply ligatures, and the clamp was left *in situ*, loosened on the fourth, and removed on the fifth day. The patient made an uneventful recovery.

The point of greatest interest in this case was the pathologic report submitted by Dr. Nicholas M. Alter which was as follows:

Specimen consists of a large kidney weighing 250 gm. It is covered by dense fibrous tags and with large bosses which give a sensation of fluctuation. Capsule cannot be stripped off, it forms a thick scarred fibrous layer which is densely adherent to surface of kidney. The pelvis is globular and firm. Ureter is 12 cm. in length is dilated and firm in consistency. On opening a great deal of thick purulent exudate is discharged from the kidney. Calices and renal pelvis are considerably dilated. Some of the calices measure 5 cm. in diameter they form cavities. The lining of these are mostly smooth, also thickened and scarred. Some knobby growth is seen in the pelvis and at the fundi of the calices. This growth has a papillary surface and on cross section shows yellow color. Similar growth is found in pelvis.

The wall of the ureter is considerably thickened, and the lumen is narrowed by similar growth. Practically no normal kidney structure is seen. The wall of the calices at places measures only  $\frac{1}{2}$  cm. in diameter, in places a thick, yellowish growth is seen. There is also an irregular mass, about 5 cm. in diameter, which is encapsulated. On cross section it shows yellow parenchyma seen in the adrenal (Fig 481)

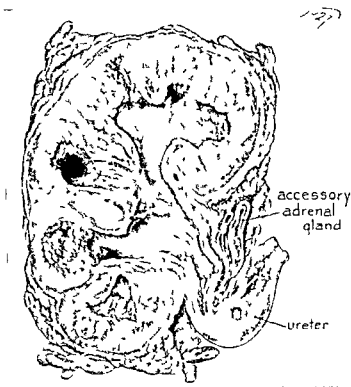


Fig 481—Drawing of specimen showing cross section of kidney with kinked ureter. Neoplastic masses lining fundi of calices. They show irregular invasion and papillary surface. Accessory adrenal gland situated at lower hilum.

Microscopic sections show a diffuse fibrosis and lymphocytosis of the interstitial tissue. Most of the glomeruli show various degrees of hyalinization. The tubuli are irregularly dilated. The striking feature of the sections is the peculiar growth lining the calices. This consists of large pale cuboidal cells arranged in trabeculae, which reminds one of the adrenal tissue. The pro-

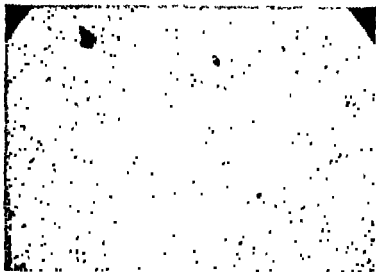


Fig 482 —Photomicrograph showing tumor like proliferation extending into parenchyma with interstitial inflammatory process Magnification about 80

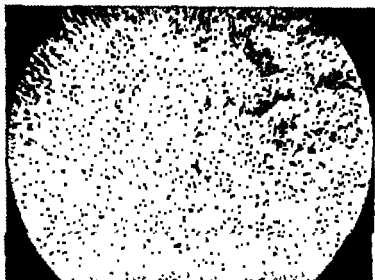


Fig 483 —Photomicrograph showing the adrenal like cells which are well differentiated and arranged in trabeculae Magnification about 200

toplasm of the cells did not stain, and shows smaller and larger vacuoles. Toward the kidney parenchyma the growth has developed a dense stroma. Some sections show the abrupt change of beginning of growth from the smooth surface. It is interesting to note some degree of variation in shape, size, and staining quality of the tumor cells. Particularly toward the capsule

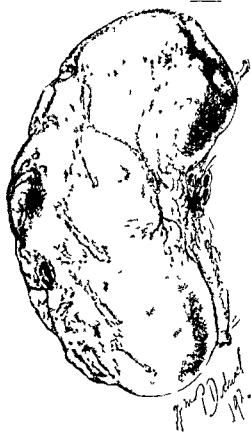


Fig. 484—Drawing of specimen showing surface of kidney with the recent surgical wound and with old scars, particularly well seen at the upper pole

these cells are quite irregular in size and shape, and their protoplasm stains darker. No mitotic figures are seen, however, anywhere. There is considerable proliferation of young blood-vessels. Sections of the ureter show a growth of darker and smaller cells than those in the kidney, and rather of carcinomatous appearance. Section of the adrenal-like nodule shows the trabecular structure

of the adrenal with large pale cuboidal cells similar to the ones that line the calices. The trabecular structure of this nodule does not, however show the characteristic layers of the adrenal. No medulla is seen (Figs 482-484)

**Pathologic Summary**—The prominent feature of the gross pathology in this kidney is a growth like proliferation which however does not spread from one single focus but seems to form independent masses lining the fundi of the calices. Its surface is papillary. As the central portion of the pelvis and calices are smooth it is rather obvious to assume that this tumor like proliferation grew secondarily in these preformed cavities. That tumor formation frequently takes place following chronic inflammatory changes has often been reported. Stoerk reported a very interesting case of general papillomatosis of the entire urinary tract following a chronic inflammatory process.

In many similar cases the regenerative hyperplasia oversteps its limit and changes into tumor formation.

In this case there is a tumor like proliferation of large pale hpyoid cells that also with their trabecular arrangement remind one of the adrenal cells. There is also a large accessory adrenal gland with an abnormal location at the lower hilum. All these seem to prove that there has been an abundance of embryonic adrenal cells within the kidney substance as well as outside previous to the inflammatory process. Following this with the regenerative process these embryonic cells produced hyperplastic masses resembling new growth.

## NOTES ON CERTAIN TYPES OF RENAL PATHOLOGY

N P RATHBUN AND N M ALTFR

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It is rather a trite remark to say that there remains much to be learned about renal physiology and pathology. Many of the various forms of pathologic lesions are reasonably well understood and catalogued and uniformly associated with a group of clinical phenomena which makes it possible to diagnose the condition present with a fair degree of accuracy. This applies equally to the group of cases which ordinarily come to the surgeon and the internist.

It is not the purpose of this brief communication to make any attempt at a review of the various types of nephritis which may occur *per se* or as part of a general cardiovascular lesion, nor of the many well known surgical lesions. This would constitute a volume, and is hardly within the scope of this discussion.

It is rather our purpose to direct attention to a type or types of renal pathology which are not clearly understood or even appreciated.

In order to make ourselves clear it might be well to state at the outset that we are attempting to present for your consideration a type of pathology which might, for want of a better name, be termed "surgical nephritis," in contradistinction to the many different forms of medical nephritis. This lesion has been recognized and described many times before, but not, in our opinion, in such a way as to clearly differentiate it both clinically and pathologically from the various types of medical nephritis. We believe the lesion which we are about to describe is a definite clinical and pathologic entity, and it is the aim of this brief contribution to so classify and differentiate it, and, further than this, to venture on certain speculations as to its pathogenesis, which we believe is entirely different from that which exists in

the various forms of medical nephritis. These latter also present with certain variations a definite pathologic and clinical picture. The lesion is bilateral and progressive is often a part of a general cardiovascular change and is practically always associated with definite pathology in other organs. Surgical nephritis on the other hand is unilateral it may be confined to one small portion of an otherwise normal kidney it is not progressive does not present any general cardiovascular change and is not necessarily associated with any existing remote pathology.

Clinically the medical nephritis presents in varying degree a fairly definite clinical syndrome such as diminished functional capacity as indicated by the various dye tests nitrogen retention as shown by the blood chemistry blood vessel changes visomotor disturbances anasarca etc. They are progressive and have a definite tendency to shorten life expectancy. In sharp contradistinction to this surgical nephritis (if we may call it that) exhibits none of the above phenomena and the functional capacity of the kidney (again as shown by the dye test) is not diminished. It apparently has no direct effect on life expectancy and presents symptoms pain and bleeding which are apt to bring them to the attention of the surgeon rather than the medical man.

Our attention was first directed to these studies and speculations by a consideration of two clinical groups of cases. First the so-called *idiopathic hematurias* and second the so-called *nephralgias* or as Fenwick classed them many years ago *chronic aching kidneys*. It is true that both of these groups have been very materially narrowed in recent years by modern methods of diagnosis and a resulting better understanding of the various pathologic lesions occurring in the urinary tract. This applies particularly to the *idiopathic hematurias*. Many cases which ten years ago would have been included in this group are now readily diagnosed as cases of *pyelitis* *early renal tuberculosis* *stones* *not opaque to the x ray* *early tumors* *stricture of the ureter* etc. There remain however a certain number of both *bleeding* and *aching kidneys* in which the cause remains obscure.

or unknown. One obvious reason for the confusion existing anent the underlying pathology in these cases is the fact that they rarely come to autopsy and almost as rarely to nephrectomy, and when they are subjected to nephrectomy it is usually subsequent to some other preceding surgery which may well have blurred the picture.

A number of these kidneys have been studied and reported by various observers and have usually been classified as nephritis or unilateral nephritis. This may or may not be correct but this simple statement does not in our opinion convey a proper appreciation of the existing pathology. This is not a simple quibble over nomenclature. The point which we wish to make is that these patients are not suffering from what we ordinarily think of as nephritis or Bright's disease, nor do we think that the lesion has any connection with that group of diseases commonly spoken of as Bright's disease. It is admitted that a single slide or even a group of slides taken from one of these bleeding or aching kidneys may present a perfect microscopic picture of what is understood and accepted as a chronic interstitial nephritis. It is also true that in some cases the lesion is diffuse, and appears to involve the entire kidney. Yet it is a striking fact that even in the presence of what would appear, under the microscope to be an advanced lesion, these kidneys show no disturbance in their functional capacity, tubular casts are conspicuous by their absence, the patient presents no evidence of cardiovascular disease, lesions are always unilateral and show no tendency to involve the remaining kidney, even when watched over a long period of years.

Rather more striking and more convincing for the purpose of strengthening our conviction than the above group of cases in which a diffuse lesion is noted is another group presenting the same clinical phenomena in which the lesions are noted in one or several parts of the kidney, and surrounded by perfectly normal healthy tissue.

While we do not wish to fall into the error so commonly made of attempting to include all cases of renal pathology, which do not readily fall into one of the well recognized groups we wish to point out and emphasize a type of pathology



which might and, we believe does explain a certain number of cases

It is our theory, supported as I say, by a certain amount of clinical and pathologic data that these lesions represent the scars of ancient pyogenic processes, that they are relatively harmless and have very little effect upon the functional value of the organ. These scars may occur as diffuse or strictly localized lesions. The pathogenesis may be variously interpreted. It is easy to conceive of a diffuse infection—pyelonephritis—in which there is an invasion of round cells into the submucosa, followed later, when the infection has subsided, by the usual fibrosis and secondary vessel changes. It is easy also to conceive of cortical abscesses which have ruptured into the cortex and have been replaced by scar tissue, to be followed also by vascular changes or the lesions may be primarily vascular, either embolic from some distinct focus or a local vessel lesion, in both cases followed by local infarcts. This part of the subject would appear to provide a fertile field for further study, handicapped of course by scanty material.

To sum up in a word, these lesions would appear to be the scars of previous pathology no longer active rather than a pathologic state at present active.

In attempting to present these views in a condensed form it would seem doubtful if we have made ourselves very clear, and it is to be hoped that the following brief summary of a few case reports and illustrations will help materially in this respect.

**Case I**—A widow of forty five first seen in December, 1919 with a history of a dull pain in the left loin and groin for the past seven years. During the past year there were three attacks of profuse bleeding from the left kidney. The pain has been much worse in the last three months enough to make her more or less of an invalid. Her physical examination was essentially negative except for moderate tenderness on deep palpation over the kidney and a somewhat irregular type of pyelogram. It is worthy of emphasis that her blood chemistry was normal the urine sterile contained no pus or casts and the phenolsulphonephathlein

elimination was normal, equal for the two kidneys. The degree of pain seemed to warrant some effort at relief, and an exploratory operation was decided upon and performed on December 23, 1919. When the kidney was delivered it was found somewhat enlarged and the contour somewhat irregular. The surface had a somewhat lumpy appearance due to a number of small cysts, which could be seen and felt directly under the capsules. The kidney was split, and on section there were noted, scattered throughout, a number of cavities varying in size from that of a pin-head to that of a large pea. While there may be



Fig. 485.—Photograph of kidney with retention cysts of so called "chronic interstitial nephritis." Much peripelvic fat. Elongated, scarred lining of calices.

some doubt as to the merit of the procedure, the kidney was removed. Obviously this kidney, as shown in Fig 485, presents the appearance of a very advanced form of chronic interstitial nephritis.

The pathologic report on sections was as follows: The general topography of the kidney was not greatly altered, although small areas of connective-tissue formation about the blood-vessels were quite striking, as well as several small cysts, one or two of which were filled with blood. In the cortex, scarred glomeruli and some enlarged glomeruli with thickened capsules, thickened smaller

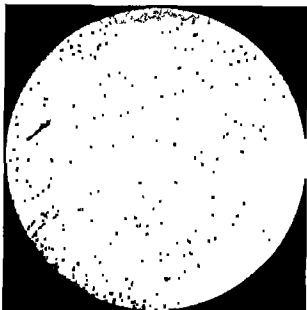


Fig 486—Low power photomicrograph showing rather diffuse interstitial fibrosis with round cell infiltration, and hyalinization of glomeruli

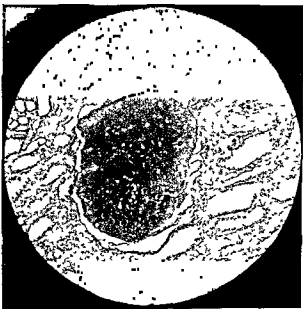


Fig 487—Low power photomicrograph showing small cysts with hemorrhagic contents. Surrounding tissue shows diffuse fibrosis

vessels, and small islands of lymphocytes with a small amount of fibrosis were the chief lesions. There were some degenerated tubules and dilated tubules containing hyaline casts. Passing toward the pelvis, the fibrosis becomes somewhat more marked, the vascular lesions were the same and the tubules somewhat less degenerative. The lining of the pelvis shows a little thickening, but no inflammatory reaction was present. The whole appearance of this kidney, gross and microscopic, suggests a vascular and glomerular type of nephritis when the cause is not known. Considerable functionally active kidney still remains (Figs 486, 487)

**Case II** (illustrating a somewhat different type of lesion) — A married woman, thirty five years of age, first seen in December, 1917. Beginning three years ago, for a period of one year, she has had slight dysuria and bladder irritability. Two years ago she had a profuse hematuria lasting for four days, which was traced to the left kidney. Following this her bladder symptoms entirely cleared up, and she was in good health except for a slight constant ache in her left loin until a few days before admission, when she had another severe hemorrhage from her left kidney. Physical examination, excepting the pyelogram, was essentially negative. Blood chemistry was normal, the urine was sterile and free from pus and casts, and the phenolsulphonephthalein elimination was normal and equal on both sides. The pyelogram suggested a filling defect. A tentative diagnosis was made of renal tumor. Operation was advised and performed. When delivered upon the loin the kidney appeared perfectly normal. It was split and an area about 1 inch in diameter was noted near the center of the kidney. This area was darker in color and firmer in consistency than the surrounding tissue, and the normal kidney markings were absent. The kidney was removed. Unfortunately, no photograph was made of the gross specimen. The microscopic report in the suspected area was as follows: There is a sharply defined area which, on section, appears to be round. It is surrounded by normal kidney parenchyma. High power magnification shows this to consist of diffuse scar tissue,

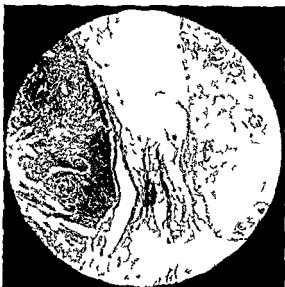


Fig 488 —Low power photomicrograph showing sharply defined border of nodule. Adjacent kidney parenchyma normal.

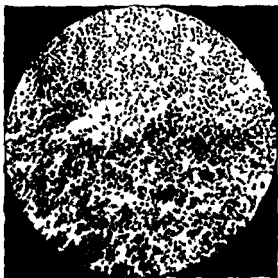


Fig 489 —High power photomicrograph showing accumulation of mature small dark lymphocytes.

which has very rich round cell infiltration. The cells are typical, small, dark stained, mature lymphocytes without any suggestion as to growth (Figs 488, 489)

It is our belief that this woman had an acute infection embolic or otherwise, at the time of her first symptoms. It is entirely possible that, at the time of her first hemorrhage she had an abscess which ruptured into a calyx. We further believe that the lesion noted at operation and consisting almost entirely of small round cells, was the beginning of a scar. The nephrectomy was, doubtless, unnecessary, and had the kidney been allowed to remain, the round cells would eventually have been replaced with fibrous tissue. This patient also made a good recovery, and has remained well to date.

**Case III**—A married man, forty five years of age, who has lived a great deal in the tropics and who has, at various times suffered with several of the tropical fevers. Admitted to the hospital in January, 1926. There was a history of repeated attacks of bleeding from the left kidney at fairly frequent intervals for the past eight years, accompanied by a more or less constant dull ache referred to the left loin which continued in the intervals between the attacks of bleeding. Physical examination in this case also was essentially negative, except for what appeared to be a slight filling defect in the pyelogram and which, when compared with another pyelogram, made at another clinic several months before, seemed to be increasing. On the basis of this, a tentative diagnosis was made of renal tumor.

Operation performed January 15, 1926. The kidney appeared somewhat enlarged, otherwise normal, except for several depressed areas on cortex. It was rather widely split. There was no evidence of tumor, but the depressed areas previously noted showed more definitely, and gave the impression of small scars. A small section was removed from the cortex at the site of one of the depressed areas and also a small section from one of the papillæ. The nephrectomy wound was repaired in the usual manner with apparently proper hemostasis. The pathologic report of the sections removed was as follows. Specimen

consists of two pieces. One is smaller, and measures 3 mm in diameter. This was removed from the tip of a papilla. Grossly it shows nothing unusual, but brown kidney tissue. The other piece is larger, measuring 7 mm in diameter and 4 mm. in thickness. The surface of this shows a drawn-in scar. The scar measures 3 to 4 mm. in diameter. On cross-section, this scar corresponds to a narrow wedge-shaped fibrosis, hard in consistency, which is surrounded by apparently normal kidney tissue.

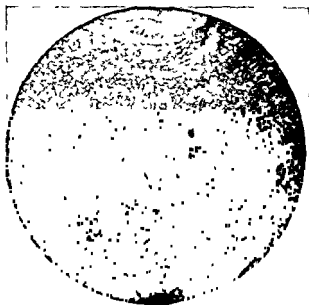


Fig. 490 —Low power photomicrograph showing wedge shaped scar with surface depression

Microscopic sections of the small piece show the collecting tubuli with cuboidal epithelium. Some of the tubuli contain red blood cells. Microscopic section of the larger piece shows the depression with thick fibrous surface. Beneath this sharply defined, wedge-shaped area shows dense fibrosis which is mostly hyalinized. There is rich infiltration of lymphocytes throughout this. In the border zone dilated tubuli are seen with colloid secretion. The vessels show thickened walls and hyperplastic endothelial lining encroaching on the lumen (Fig. 490).

The patient went along smoothly until the sixth day, when he had a furious secondary hemorrhage requiring transfusion, and prompt nephrectomy as a life saving measure. Following this he went on with an uneventful convalescence.

The kidney removed is shown in Figs 491 and 492. This illustrates rather strikingly the difficulty often attending the



Fig. 491 —Drawing of specimen showing cross-sections of kidney, with particularly scarred thickened and hemorrhagic lining of renal pelvis

pathologic study of these cases. There is of course a confusion of ancient and recent pathology which adds much to the difficulty of interpretation. It seems fair to assume that the lesions noted were scars of old infections probably embolic and since they were the only pathologic lesions present it would seem fair, too, to assume that in some way or another they accounted for the bleeding. Here again we have a lesion which might perhaps



be fairly termed "nephritis," but which certainly has no clinical or pathologic similarity to any of the ordinary types of nephritis. The pathologic report is as follows.

*Pathologic Diagnosis*—Chronic and acute pyelonephritis and thrombo angitis with old and recent infarction

Kidney weighs 290 gm, measures  $14 \times 9\frac{1}{2} \times 5$  cm Capsule strips with some difficulty, leaving an irregular surface Surface is pale, yellowish brown in color, with numerous, irregular bulg-

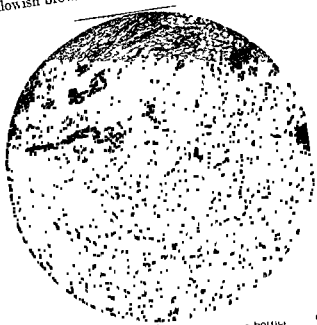


Fig 492 —Photomicrograph showing hemorrhagic botul. cent infarct

ings and depressions Some of these are red, others are white There are also star-like, drawn in scars The white areas are sometimes very small On cross-section very numerous, smaller and larger, wedge-shaped areas are seen, some of these are red and hemorrhagic, others are necrotic and anemic Two of the pyramids are places of extensive hemorrhages Each measures about 5 cm in diameter, seem to consist of fresh red clot The star-like scars correspond to fibrous areas reminding one of healed infarcts The renal pelvis is dilated, about 5 cm in diameter,

and also filled with large amount of red clot. Lining of the renal pelvis is smooth, thickened, and shows also extensive hemorrhages. Smaller hemorrhages are covering the tips of all papillae. The lining of some calices show old, white scars.

Microscopic sections show a great variety of pathologic pictures. There are large areas of older and recent hemorrhages. The older hemorrhages show organization with fibrosis. The recent hemorrhages are surrounded by inflammatory reaction, which is marked by polymorphonuclear leukocytes. Other sections show extensive areas of necrosis with uniformly granular, unstained tissue where the structure of the kidney is partly preserved. Some of the areas of necrosis show replacement by fibrosis. Older lesions show complete replacement by organization, as described in Case III. Definite changes are seen in most vessels. They are surrounded very often by infiltration, and lymphocytes and polymorphonuclear leukocytes in varying amounts. The intima of some vessels shows hyperplasia of endothelial cells. The lumen of some vessels contain hyalinized material, in others, adherent clot of red blood cells and fibrin (Figs 492, 493).

**Pathologic Summary**—In the unilateral nephritis the most conspicuous features are in the infarct like, well defined areas. These appear on the surface of the kidney as slight elevations or depressions. Cross sections of such kidney may show wedge shaped areas of yellow sections, with a hemorrhagic border zone as in Case III. This shows an obvious example of fresh anemic infarct. In Case II scar like areas are seen which remind one of the healed infarcts as in cases of endocarditis or of the scars as in cases of arteriosclerosis.

These features suggest circulatory disturbance. Subsequent histologic studies confirmed this assumption. Various stages of inflammatory changes were found in the walls of arteries. In Fig 493 some of the essential features are clearly seen. The layers of the vessel wall become indistinct, the adventitia is invaded by inflammatory infiltration of lymphocytes and polymorphonuclear leukocytes. The media shows mucoid degeneration containing some blue stained, mucoid material. Lumen is

almost completely obliterated, partly by the hyperplastic endothelium and partly by some fibrin undergoing organization. This process of thrombo-endarteritis can be observed in various stages according to the age of infarction, which, in the end, heals by replacement with an old scar.



Fig 493 —Interstitial fibrosis and lymphocytosis of kidney with artery, which shows also marked inflammatory changes and is almost completely obliterated due to marked endothelial hyperplasia. Magnification  $\times 200$ .

According to the size of the artery, a smaller or larger area is involved in the process. This thrombo-endarteritis is the result of previous renal infection which clinically healed.

A certain stage of the arterial changes will produce anatomic changes in the renal parenchyma with subsequent clinical symptoms, which are, however, naturally different from the first clinical picture from an acute renal infection.

We are evidently dealing with vascular nephropathy. It should be emphasized that inflammatory changes do not only affect the walls of the arteries but also those of the veins. It would be beyond the limit of this discussion to go into further details, or to discuss the results and course of infection affecting kidney parenchyma, arteries, and veins. More extensive study will be reserved for a further analysis of the subject.

In conclusion, we do not wish to be misinterpreted as recommending radical surgery in the treatment of bleeding and aching kidneys. We have used the term "surgical nephritis" as being suggestive of the type of symptomatology rather than for the purpose of indicating a line of treatment. The cases reported were selected for the sole reason that they presented material for study. It is, in fact, doubtful if nephrectomy was logical in any of them.



## UNILATERAL FUSED KIDNEY COMPLICATED BY CALCULUS

N P RATHBUN

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THIS case would appear to be of sufficient interest to warrant its presentation, not only because of the relative rarity of the condition, but also as a means of illustrating the possibility of diagnostic errors which may readily be made, and which at the same time, should be easily avoided

The rarity of the condition is well illustrated by a paper of Kretschmer's, published in the Transactions of the American Association of Genito urinary Surgeons in 1924. He made a careful survey of the entire literature and found only 28 clinical cases and, of these, only 3 were complicated by calculus. I have no doubt that the condition may occur more frequently than this report would indicate, since many of them are perhaps not reported but it emphasizes the fact that this is one of the rarer types of renal anomalies.

This patient was a male of fifty five years, who presented himself for examination and treatment in June, 1925, with the following history. Cholecystectomy sixteen years ago, following which he had a very stormy convalescence with complications requiring two or three secondary operations, and a stay in the hospital of nearly six months, terminating finally in complete recovery except for a large ventral hernia which he still has.

This experience left him with a wholesome dread of hospitals and operations. He had gonorrhea several times in youth, the last time at twenty two. Following this he had sounds passed at occasional intervals for ten years. He was married at twenty-six, and has one child, living and well. He has been in excellent health since his gall bladder operation until eight months ago,

when he developed a sense of discomfort rather vaguely ascribed to the hypogastrium and accompanied by frequency of urination. At this time he consulted a doctor, who passed sounds for awhile apparently with some relief. Four months ago he passed very bloody urine for several days. The bleeding recurred five weeks later and again two days ago and continued up to the time of his examination. General physical examination was



Fig. 494.—Plain picture taken on two plates negative for calculus. Blank space indicates an area of about  $\frac{1}{2}$  inch which was not covered by either of the pictures.

negative except for a large ventral hernia and what appeared to be a large left kidney. The right kidney could not be palpated. The voided urine was very bloody and contained in addition to numerous red blood cells and leukocytes a few distinct clumps of pus cells. Examination with the bougie showed two stricture bands in the bulb catching on a No. 24 French sound. Cystoscopy showed a normal bladder with ureter orifices normally situ.

ated. Clear urine was seen coming in rhythmic swirls from left ureter, and very bloody urine from the right ureter. Nothing further was done at this time and we were content with having located the source of the blood in the right kidney. He was referred to the hospital and kept in bed until the bleeding ceased, which it did in a few days when he was again submitted to examination, including cystoscopy, ureter catheterization and radiographic study. Number 5 x ray catheters passed readily



Fig 495 —Unilateral kidney right ureter apparently draining upper pelvis

to the kidney pelvis on each side. The urine from the left side was normal, that from the right side contained a number of red blood cells and a few clumps of pus cells. The urea and the phenolsulphonephthalein test were normal and equal on the two sides. Cultures of the urine were sterile. Plain radiographs were made of the entire urinary tract, using one 11 x 14 inch plate for the kidneys and upper ureters and a similar plate for the lower ureters and bladder. A pyelogram and ureterogram were then made



on the right side using a total of 22 c c of a 15 per cent solution of sodium iodid. One 11 x 14 inch plate was used for the pyelogram and a large plate (14 x 19 inches) to include the entire pyelo ureter ogram. The plain pictures were negative for calculi but showed both catheters passing over to the left side the right catheter apparently passing to the upper pole of a large unilateral fused kidney the left catheter passing to the lower pole. The pyelo



Fig. 496.—Plain picture covering entire urinary tract showing calculus in upper (?) pelvis drained by right ureter.

ureterogram confirmed this and disclosed a very irregular type of pelvis. The ureter except for its unusual course appeared normal (Figs. 494-495).

Our diagnosis then was pyelitis involving the upper pole of a unilateral fused kidney with the possibility in mind (in view of the bleeding) of neoplasm. This diagnosis seemed logical in view of our findings and yet it was entirely inadequate as subsequent developments will show. The patient was placed upon

urotropin, gr.  $7\frac{1}{2}$  t. i. d., and asked to report in three months for another examination. We were somewhat at a loss to account for his hematuria, and felt that we could not exclude neoplasm. The idea of a later examination was for the purpose of noting any change in contour of the renal pelvis, which would be likely to occur if tumor were present.



Fig 497.—Pyelogram of pelvis drained by right ureter, calculus covered by sodium iodid in lower calyx. Left ureter passing upward to pelvis above right ureter evidently drains upper pelvis.

The patient reported again in October. In the meantime there had been no further bleeding; he had continued to have a vague sense of discomfort in his abdomen, and the urinary frequency had persisted. The urine still contained a moderate number of pus-cells. He was again referred to the hospital for re-examination. The findings were identical with those noted at the first examination, except the radiograms, which, when properly made, presented an entirely different picture. One plain picture was taken, using a 14 x 19 inch film and covering the entire urinary

tract (Fig 496) Another right pyelogram was also made These pictures showed clearly that the right ureter drained the lower segment of the kidney and that the left ureter passed up lateral to the kidney and drained the upper segment (Fig 497) It also showed a good sized calculus in the lower calyx of the lower segment This had been entirely missed at our first examination A few days later a pyelogram was made of the upper pelvis (Fig 498) Our corrected diagnosis now was calculus in



Fig 498 —Pyelogram of upper pelvis calculus noted in lower pelvis

the lower segment of a unilateral fused kidney The cause of our original error was due to the fact that in making our plain pictures the small area which included the stone had fallen between the two plates The first right pyelo ureterogram was taken on a large film but this also failed to reveal the calculus for the simple reason that it was now covered by the sodium iodid solution Furthermore in removing the cystoscope the catheters had been partly withdrawn as a result of which the right catheter appeared to be in the upper segment

This error in diagnosis did no harm and of course was eventually corrected. A similar error might however lead to definite neglect of an easily remediable problem. Such a lapse is readily avoidable probably would not occur in most clinics and yet might occur in any clinic. I am quite sure that it will never occur again in my clinic. The practical point and I think it is a very important one is this. Whatever else we do we should always make one plain picture with opaque catheters in position, which will completely cover the entire urinary tract.

Operation was advised and declined. It is perhaps of some interest to speculate upon the method of operative approach. I had decided to employ a pararectal paraperitoneal incision. This would sacrifice a certain amount of nerve supply but it would provide ample room which would seem to be essential. In view of the possibility of prolonged drainage it would hardly seem wise to go through the peritoneal cavity. The probable immobility of the kidney and the anteromesial situation of the pelvis would seem to be factors in deciding against the usual loin incision.

Frank L. Longwell



## NEOPLASMS OF THE ILEOCECAL VALVE

### Report of Three Cases Complicated by Intussusception

WALTER A. SHERWOOD

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WHILE the diagnosis and surgical management of new growths of both the large and small bowel are on a sound basis of understanding, comparatively little has been said or written on neoplasms having their origin in or at the site of the ileocecal valve. Surgical lesions of the gastro-intestinal tract, and especially new growths, are most commonly met with at the points of greatest constriction, where the alimentary tube changes both in structure and function, and where a valve or valve-like action has been provided for the expulsion of the food current from one part of the digestive tube to another. These points of greatest constriction are the esophageal orifice of the stomach, the pyloric ring, the ileocecal valve, the rectosigmoid juncture, and the anorectal pouch. It would seem as if constant irritation and increased muscular action or spasm at the points of greatest constriction might play some part in the etiology of new growths in these situations, and from the same analogy it may be reasonable to expect the occurrence of a larger number of neoplasms at the ileocecal juncture than have been recorded in the past.

Within a comparatively short period of time (less than two years) we have encountered three such neoplasms which had their origin in the septum dividing the cecum from the ileum. All were on the cecal side of the valve, and, strangely enough, in each instance there was an associated intussusception, caused, no doubt, by the presence of the tumor.

This fact alone would indicate the necessity of a careful search for the presence of a neoplasm in all patients with intussusception in which the ileocecal valve is involved.

These cases will be briefly discussed in the order of their occurrence.

**Case I Carcinoma Simplex of Ileocecal Valve—Intussusception**—A married woman thirty eight years of age entered the hospital because of abdominal pain. The onset had been acute three months previous to admission when she was seized with a sudden intense pain in the right upper abdominal quadrant. This was followed by rectal tenesmus and the passage of a large amount of blood. Since then there had been a constant feeling of drag in the right side of the abdomen with almost daily attacks of sharp pain. The pain had no relation to meals there was no nausea or vomiting. On three occasions she had unusually severe attacks of pain associated with the passage of bloody material from the rectum and extreme weakness. During the three months in which these symptoms persisted there was a weight loss of 55 pounds. There was no diarrhea or constipation and her previous history had no bearing on the condition for which she entered the hospital.

Physical examination on admission was negative except for the abdominal condition. In the right iliac fossa an easily palpated mass the size of a large lemon was found. This was freely movable and slightly tender.

Proctoscopic examination showed a normal rectum and lower colon except for the presence of blood and mucus. Test meal negative. Examination of stools showed the presence of blood. Hemoglobin 65 per cent. red blood cells 3 900 000.

An x ray study was made with the following findings. Opaque enema fills the entire colon tract. No gross filling defect seen. There is an area in the cecum which is less dense than the surrounding colon but the outer contour of the colon seems negative. Transverse colon is apparently negative.

Examination made twenty hours later shows a little residue in the region of the hepatic flexure and some in lower descending colon and sigmoid. The left kidney seems a little large.

*Findings*—No gall stones seen but gall bladder shadow is visible. There are well defined whirls of barium seen in the region of the hepatic flexure. This apparently is residue from enema given two days previously. With patient prone stomach comes to the level of the first lumbar vertebra. With patient

erect, it comes about 6 inches lower. It is rather large, and is not seen in active peristalsis. No constant filling defect seen. Stomach extends far to the right, and shows pressure defect. No satisfactory cap is seen. Meal passes slowly into the small intestine (Fig 499).

After five and three quarter hours. Slight gastric residue. Meal scattered through the small intestine and it is entering the cecum. It is in this area that the barium is seen as a whirl with the central area less dense. The ileum at the ileocecal valve is constricted, and the ileum back of it seems dilated.

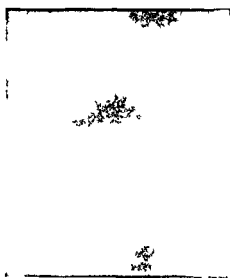


Fig 499—Carcinoma of ileocecal valve. Shows defect in cecal wall after bismuth enema which reduced intussusception.

At the end of twenty four hours. Colon tract seen from cecum to rectum. Same defective area seen up to the hepatic flexure, in fact, this region looks identical with twenty hour examination after enema. Transverse colon spastic. Descending colon, sigmoid and rectum about normal.

Defective area in right colon seemed to be exactly over tender mass felt on palpation. This defect probably corresponds to area of less density seen in cecum in enema examination (Fig 500).

*Preoperative Diagnosis*—Gall bladder disease, carcinoma of cecum with obstruction close to hepatic flexure.





Fig 500—Carcinoma of ileocecal valve showing whirls of barium at hepatic flexure, later found to be due to intussusception (twelve hours after barium meal)

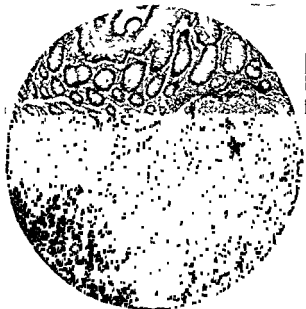


Fig 501—Photomicrograph showing histology of cancer of ileocecal valve (carcinoma simplex)

On March 13, 1924 the patient was submitted to operation. A right rectus incision was made from just below the free border of the ribs well down below the umbilicus. A movable tumor, about the size of a large lemon, was found in the transverse colon. It seemed like a tumor with a long pedicle. The transverse colon was opened longitudinally for inspection of the tumor which was found to be an intussuscepted adenocarcinoma of the base of the cecum. This had been carried up through the ascending colon into the transverse colon, and seemed impossible of reduction.

*Procedure*—1 Tumor and attached cecum were drawn still further up on the inside of the bowel. A Payr clamp was secured around the bowel about 2 inches below the growth, which was then removed with cautery, together with healthy bowel. Edges were united with a double row of continuous chromic sutures. The longitudinal wound in the bowel was closed with a double row of Lembert sutures of chromic catgut, and the external wound in the cecum was closed in a similar way. 2 A loop of the terminal ileum was brought up to the transverse colon, and a side to side ileocolostomy was done in the usual manner. A layer of iodoform gauze was inserted down to site of resected bowel and brought out at lower end of wound. Wound closed by layer sutures as usual.

The patient made an excellent recovery, and aside from distention and the usual discomfort of three days' duration she improved rapidly, and a good fecal current had been established at the end of the sixth day. From this time on she had daily normal bowel movements.

There was a discharge of colon bacillus pus from the drainage tract which persisted for about a week and then promptly cleared up. The remainder of the wound healed by primary union.

She was discharged from the hospital at the end of three weeks improving rapidly in general health and free from all symptoms.

*Microscopic Examination*—The tumor is lobulated, composed of narrow infiltrating and anastomosing strands of epi-

thelial cells. The mucosa is ulcerated over the crests of the hypertrophic and infiltrated rugæ, the tumor reaches the muscularis. The subserous coat shows edema and recent proliferation of fibrous tissue and is infiltrated with round cells. No gland formation is observed in the tumor.

*Histologic Diagnosis* — Carcinoma simplex of ileocecal valve

This patient was presented before the New York Surgical Society shortly after her recovery from operation. She has been seen at regular intervals and up to the present time, has remained in excellent health. She has regained all of her lost weight, and has no digestive or bowel disturbance of any sort.

**Case II Fibroma of Ileocecal Valve—Intussusception —J C** four months of age admitted to the hospital January 18,



fibromata

Fig. 502 — Fibroma of ileocecal valve. Appearance of growth at post mortem following operation for gangrenous intussusception. Note the almost complete obstruction of the valve.

1926. The baby had been perfectly healthy until three days before admission, when he started vomiting. Feeding was discontinued, but the vomiting continued and the next day an enema

was given, with very little return. This was followed shortly by the passage of some blood and mucus. Subsequently the bowels did not move at all. The vomiting continued. On the day before admission a diagnosis of intussusception had been made, and an attempt made to reduce this with hot baths, calomel and castor oil, with no result.

*Physical Examination*—Acutely ill baby, sunken eyes, dehydrated. Respirations rapid, temperature 105.8° F. Heart

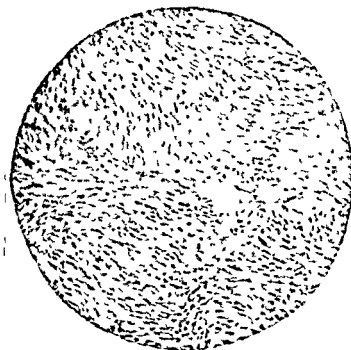


Fig 503 —Photomicrograph showing typical histology of fibroma

very rapid, otherwise negative. Abdomen very much distended, but not rigid. Rectal. A hard mass about the size and shape of a finger is felt anterior to the rectum. There is a little bloody mucus coming from the rectum.

*Operation* (January 17, 1926)—No anesthesia. Four inch incision in mid-abdomen.

*Procedure.*—Palpation located knuckle of intussusception which was reduced from rectum to cecum, 2 inches of cecum, together with part of the terminal ileum, could not be reduced.

This was anastomosed to side of ascending colon with small Murphy button and portion of ileum and cecum cut away. Wound closed with one continuous suture. Child died shortly after completion of operation.

*Pathologic Report* (January 19, 1926) —Specimen consists of the cecum and appendix. Cecum measured 4 cm. in length. Mucosa is partly hemorrhagic, and covered with necrotic friable material. At the site of the ileocecal valve there is a growth projecting into the lumen. The growth has a flat base, about 2 cm. in diameter. Upper surface also necrotic and hemorrhagic. Cross section of growth shows tendinous shiny tissue. Appendix is 4 cm. in length. Serosa slightly congested.

Microscopic section of growth shows well formed spindle shaped cells, which are firm bundles running in all directions. No mitotic figures are noticed. There is marked inflammatory infiltration near the surface (Fig. 503).

*Autopsy Findings* —1 Fibroma of ileocecal valve. 2 Intussusception and gangrene of cecum.

*Case III Lymphosarcoma of Ileocecal Valve—Intussusception* —S. K., a Polish girl, twenty three years of age, was admitted to the hospital in April 1926. Her chief complaint was pain in the right side of the abdomen. Four months previous to admission she began to have attacks of severe abdominal pain beginning at the umbilicus and radiating to right flank and groin. At first pains came about every two days, lately they have been continuous except when relieved by morphin. Pain not affected by food but vomited whatever she took by mouth. Bowels constipated.

*Past History* —General health very good until a year ago when she began to have trouble with her nasal sinuses. She had not been well since then. Measles, etc. in childhood. No operations or injuries.

*Physical Examination* —Lips very dry. Tongue thickly coated. Pharynx acutely red and inflamed. Tonsils large, appearing swollen and inflamed. Heart and lungs negative. Abdomen. Scaphoid soft. About 2 inches below costal margin,

and 3 or 4 inches to right of midline a movable mass about 2½ inches in diameter was felt. This seems to be a part of a larger mass, which fills the flank between the costal margin and the crest of the ileum. The mass is slightly tender to palpation.

*Rectal Examination* (April 6, 1926)—Urinary tract. Contraction in right kidney pelvis. Stricture of right ureter.

April 7, 1926. Ileal ptosis. obstruction in region of hepatic flexure probably due to intussusception (Fig. 504).



Fig. 504.—Lymphosarcoma of ileocecal valve. Barium enema showing defect in cecum and whirls suggesting presence of intussusception.

*Preoperative Diagnosis*—Tumor of cecum and intussusception.

*Operation* (April 12, 1926)—Right rectus incision. On opening the abdomen the terminal ileum, appendix, and caput coli were intussuscepted well up into the transverse colon. A hard mass was found in the intussuscepted organs. Intussusception readily reduced to normal position. A hard tumor was found involving the head of the cecum, ileocecal valve, and about 1 inch of the terminal ileum, which was edematous and thickened to about the size of a lemon. Thickening evidently due to chronic or re-

peated attacks of intussusception. Tumor appeared to have its origin in mucosa of the ileocecal valve. Few enlarged lymph nodes in mesocolon. Resection of last 6 inches of terminal ileum, of entire cecum, and ascending colon as high as the hepatic flexure. Intestines were clamped and resected by the cautery method. Three rows of inverted sutures used in stumps of both ileum and colon to close the cut ends of the bowel. Side to side anastomosis was then made between terminal ileum and transverse



Fig. 505.—Drawing of specimen showing tumors of ileocecal valve with surface necrosis and sarcomatous transplants in lymph follicles of small intestine (lymphosarcoma)

colon, using layer suture technic. Enlarged lymph nodes were removed from mesocolon. Hemostasis secured, cut leaves of peritoneal reflection sutured together. One cigarette drain inserted in retroperitoneal space. One cigarette drain to site of anastomosis. Both drains brought out in lower angle of wound. Abdomen closed in layers in the usual manner.

*Pathologic Report*.—Lymphosarcoma of ileocecal valve with necrosis, chronic lymphadenitis, edema and congestion of small and large intestines (Fig. 505).

Patient was discharged May 12, 1926. Condition excellent. Very small sinus still present (Fig. 506).

Second admission (September 15, 1926) Following operation patient felt quite well until one month ago, when she began having pain in the abdomen near the umbilicus, radiating upward through the epigastrium, and laterally through the right loin. Appetite had been fairly good. During the past two days pain has been more severe, and has been accompanied by frequent

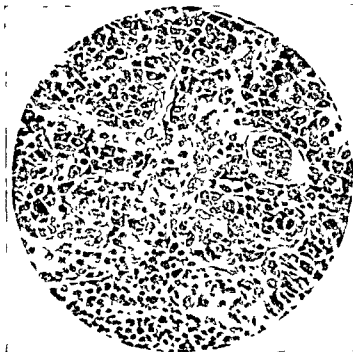


Fig 506 —Photomicrograph showing high power manifestation of characteristic structure of lymphosarcoma. Numerous mitotic figures

attacks of vomiting. During the past month a lump has appeared just below the left mastoid tip.

*Physical Examination.*—Practically the same as on previous admission. Abdomen slightly distended. Irregular, large, tender mass extending from epigastrium laterally into right loin.

The patient gradually developed metastases in the mesenteric and retroperitoneal glands, and in the lymphatic structures of the



True sarcomata are divided into three classes by Ewing,<sup>12</sup> quoting Weichselbaum

1 Spindle cell sarcoma—extremely rare, probably capsular in origin

2 Endothelial sarcoma—the most frequent variety, quite malignant

3 Primary lymphosarcoma

The present case belongs in the last category. It is reported not merely because of its rarity, but because of its diagnostic interest and some unusual features.

**Report of Case**—The patient was first seen in December 1925, complaining of a cough and some pain in the left chest. In the course of a routine examination a large tumor mass was felt in the left upper quadrant of the abdomen, extending below the umbilicus. She had no abdominal symptoms. There were a few râles in the left chest, and an apparent anemia. The patient said she had noticed a "lump" in the abdomen for about three years, but had suffered no inconvenience. She was referred to The Brooklyn Hospital for study, and entered there December 20, 1925.

On admission her history was as follows:

**Chief Complaints**—Cough, weakness, abdominal tumor.

**Present Illness**—Patient has had spasmodic cough for five or six years, occurring rather frequently, chiefly after meals. No hemoptysis. She had noticed the presence of the abdominal tumor for three years, but thinks it has not increased much in size. There were no symptoms, save for a sense of weight in the abdomen, and a "full feeling" after even a small meal. There was no pain and no constipation. Her general health was fairly good aside from some weakness. There was also some loss of weight. She weighed 115 pounds ten years ago, now weighs 85.

**Family and Past History**—Negative.

**Physical Examination**—Patient is a small thin white woman of fifty six, quite pale, but showing no evident distress. No areas of pigmentation. Temperature 98° F, pulse 72, respirations 20.

**Head, Ears and Nose, Mouth, Throat**—Negative.

*Chest*—Poorly developed Expansion poor but equal on both sides Tactile fremitus normal Slight dullness at left base and left axilla Some coarse rales at this latter point

*Heart*—There is a soft systolic murmur not transmitted at apex Blood pressure 110/60

*Abdomen*—There is a large mass, practically filling the entire left side of the abdomen It is hard, and extends about 8 cm below umbilicus It can also be felt in the left flank At least one notch can be made out No tympany over the mass It is slightly tender No other masses Liver edge not felt

*Lymph glands*—Several small, hard, discrete glands in both groins, and one small one in right anterior cervical chain

*x-Ray Examination*—Both kidneys are a little low, left slightly larger than the right There is a shadow in the right abdomen as from a low liver, and in the left abdomen as from an enlarged spleen Opaque enema fills colon, save for a pressure defect at the splenic flexure

*Lungs*—General haziness over left apex and left lower chest Increased hilum density on both sides, and increased peribronchial thickening through middle and lower portions of both lungs but more on left

*Diagnosis*—Old parenchymal involvement of middle portion of left lung Enlargement of spleen

There was some question as to the liver being enlarged, but the left sided mass being definitely splenic in origin, an admission diagnosis of chronic lymphatic leukemia was made However, the *laboratory report* was as follows

*Blood*—Hemoglobin 60 per cent, red cells 3,720,000 No abnormal cells seen on a smear, but a moderate secondary anemia White cells, 23,700 Differential Polymorphonuclears 74 per cent Small lymphocytes, 14 per cent, large lymphocytes, 12 per cent, no myelocytes Wassermann negative Icterus index, 4 Van den Bergh negative Fragility test Hemolysis begins at 0.475 per cent, and is complete at 0.3 per cent after one hour

*Urine*—Negative save for a trace of albumin

Repeated blood counts always gave a leukocytosis, but no relative increase in lymphocytes It was thought that possibly

the patient was in an *a*-leukemic stage. She was allowed to go home for Christmas, and returned in a week. A biopsy was then done on one of the left inguinal glands. The pathologic report on this was chronic lymphadenitis with some hyperplasia of lymph tissue, but no suggestion of malignancy, no Hodgkin's picture. Exploratory operation was advised, but, owing to the patient's poor condition, she was again allowed to return home.

She was readmitted one month later, January 25, 1926. Blood count was then: Hemoglobin, 72 per cent, reds, 4,910,000, white cells, 37,850, polymorphonuclears, 79 per cent, small lymphocytes 20 per cent, large lymphocytes, 1 per cent.

Laparotomy was done on January 29, 1926, by Dr. Sherwood. Left rectus incision extending from free border of ribs almost to pubis, revealed a large nodular tumor of spleen which occupied almost the entire left side of the abdomen. The tumor, in its growth downward, had pushed the transverse mesocolon ahead of it and was adherent to it. It was also adherent above to the diaphragm, laterally to parietal peritoneum and medially to the stomach. There had been considerable perisplenitis. The tumor was very vascular and considerable bleeding followed stripping of adhesions. The tumor was delivered outside the abdomen, pedicle clamped, and mass removed. A small nodular tumor was felt in the pelvis, but found to be a fibromyoma uteri. It was deemed wise to remove this because of possible relation to the splenic tumor, so a rapid supravaginal hysterectomy was done. No other pathology found. Liver and other organs were normal, no metastases. Retroperitoneal nodes not enlarged. The gross appearance of the spleen was that of primary sarcoma. A cigarette drain was placed in the subdiaphragmatic space.

*Pathologic report* was lymphosarcoma of spleen. Spleen weighed 1650 grams. It measures 29 x 15 x 12 cm. The surface is covered with large, yellowish nodules from 1 to 4 cm. in diameter. Fibrous adhesions cover upper portion. The capsule shows large, sugar coated areas which at places are 2 to 3 mm. in thickness. The edge shows a number of deep notches. There are large, dark blue areas having an angiomatous appearance. On cross section, very little splenic tissue is seen being replaced

by a soft, gray growth of confluent nodules. There are scattered bits of pale red splenic pulp. Near the surface dark purple

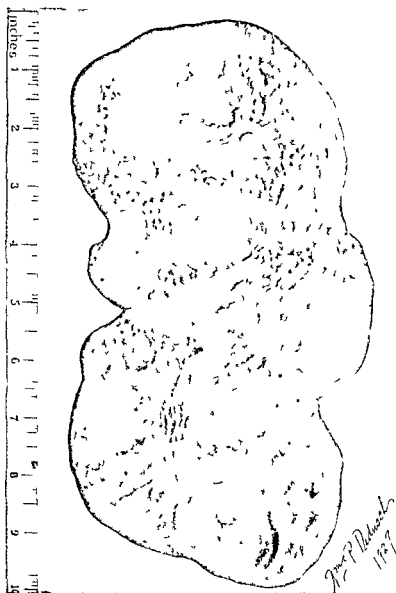


Fig 507 —Drawing of gross specimen. Lymphosarcoma of spleen showing convexity of organ with perisplenitis and bulging tumor nodules

angiomatous areas are seen. There is some necrosis. No thrombosed vessels found. Microscopic examination (Fig 509) shows a malignant growth of immature lymphocytes. Nuclei

are pale, large irregular in shape with numerous mitotic figures  
There is a reticular stroma

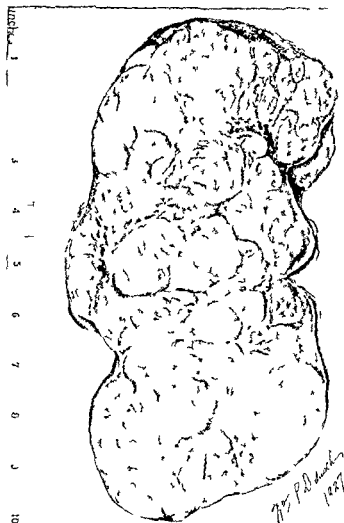


Fig 508 —Cross section of splenic sarcoma showing splenic pulp almost completely replaced by large tumor masses

The myoma uteri was typical with some old calcified deposits  
No suggestion of malignancy  
Postoperatively the patient ran a very smooth course no

vomiting, the temperature rose only to 100° F and was normal on the fourth day. The drain was removed in forty eight hours. She was discharged from the hospital on the eighteenth day in good condition.

On discharge the patient's weight was 83 pounds. Her only complaints were weakness and dizziness on sudden movements of

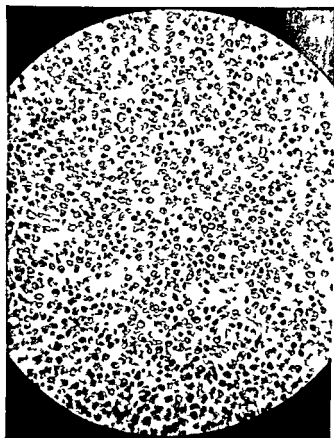


Fig. 509—Primary lymphosarcoma of spleen. Nuclei large, pale, and irregular in shape. Many mitotic figures.

the head. The latter was quite severe and persisted for several months. It was not dependant upon low blood pressure, for this averaged about 120/60. One week after discharge the patient noticed an enlargement of the left thigh and inguinal region. There was some soreness and edema of the ankle. This has persisted. A diagnosis of phlebitis was made and the leg elevated.

After several weeks the swelling of the leg was less, but that in the groin remained.

After three months several small glands were felt where the biopsy had been done. These increased slowly in size. At this time the patient's appetite and strength were good. Her weight had increased to 90 pounds and she was able to do her work. Abdominal examination was negative for any masses.

At six months the patient was in excellent condition, the abdomen was negative but inguinal glands were slightly larger. There was less edema in the ankles. She still had some dizziness.

One year later in December 1926 she complained of soreness in the inguinal glands which had increased in the previous two weeks. Examination showed more swelling in thigh and edema of ankle. The scar of the biopsy was raised by a tender nodule at least  $2\frac{1}{2}$  inches in diameter. There were several other glands palpable, the whole matted together.

She was immediately referred back to the hospital. Examination of the abdomen was negative, liver edge normal and no masses felt. Vaginal examination showed no indication of involvement of deep glands. The mass in the groin was examined by several surgeons but deemed inoperable. Radium therapy was advised but refused by the patient.

At the suggestion of Dr. Westbrook she was given colloidal lead therapy. One week after the first treatment another biopsy was done on the inguinal nodes. This was suggested because of the uncommonly long history of the splenic sarcoma—two to three years—so that it was felt that she might have had abdominal Hodgkin's disease with a secondary sarcoma developing in the spleen.

Under local anesthesia a mass of glands 3 inches in diameter was removed from the site of the first biopsy. Several deeper glands were seen but were adherent to the femoral vessels and not removed. The superficial nodes were very necrotic, their centers being almost fluid. The pathologic report, however, was not Hodgkin's disease but metastatic lymphosarcoma. Microscopic section showed within an irregular fibrotic capsule a small periphery, where active growth of immature lymphocytes

is seen Three fourths of the central portion consists of cheesy necrosis (Fig 509)

This necrosis was a very interesting factor Was it due to the lead, or the usual breaking down of sarcoma? The fact that she had a fever and pain in the glands on admission, previous to lead therapy, would seem to point to the latter

At present, February, 1927, the patient is at home, in good condition save for the swollen thigh quite able to do her house work There is still a mass palpable in the left groin, so that although she is to receive further lead therapy, the prognosis is not good The one redeeming feature is that this particular tumor is of the slow growing variety

Discussion—This case is interesting particularly in the difficulties of diagnosis On admission, although she was losing weight, the long history was against neoplasm No leukemic picture could be found The liver was not large and there was no ascites Cirrhosis and Banti's disease were ruled out It was not a familial disease Gaucher's splenomegaly was excluded as there was no pigmentation, no eye changes, and she was beyond the usual age Syphilis was not present, either serologically or clinically Tuberculosis of the spleen was highly improbable even in view of an old chest lesion The anemia was not sufficient for a "splenic anemia," and the various blood tests showed the absence of any type of jaundice or polycythemia The leukocytosis might well go with a sarcoma, but the time element, as stated, seemed too long An abdominal Hodgkin's was also possible, even without adenopathy Exploration was advised, and proved justifiable, since it has given this patient fair health for at least a year

Conclusions—1 Primary lymphosarcoma of the spleen is quite rare less than 75 cases having been reported in the literature

2 Its presence, however, must be considered in the differential diagnosis of splenomegaly, especially with a persistent leukocytosis of normal relativity

3 Exploratory laparotomy is justifiable if necessary to clear up the diagnosis



4 Splenectomy has given several cures (four or five in the literature).

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## SARCOMA OF INTRA ABDOMINAL TESTICLE

WALTER A SHERWOOD

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THIS young man, twenty four years of age, entered the hospital because of severe pain in the right lower abdominal quadrant and sacral region. He had been having attacks of pain for five months previous to his admission. He stated that he has had an enlarged abdomen for several years.

On examination, he was found to have a large firm mass about the size of an adult head which filled the lower right side of the abdomen. The tumor seemed fixed, especially the lower portion of it, was slightly nodular and in places seemed semi fluctuant. Further examination revealed the fact that both the testicles were undescended.

The patient was submitted to complete x ray and urologic studies with the following result.

Constriction of the right ureter with moderate hydronephrosis, probably due to outside pressure. The ileum was massed against the cecum which was dilated and pushed upward probably due also to pressure.

A diagnosis of tumor of an intra abdominal testis was made and on December 12, 1925, the abdomen was opened through a long right rectus incision, exposing a large irregularly shaped tumor about the size of an adult head. Although it appeared to be intraperitoneal it was covered in front by a thin layer of parietal peritoneum, and was attached by a broad base to the site of the internal inguinal ring. Numerous loops of bowel were adherent to it above and the bladder was attached to its lower and inner surface. The bladder, intestines and all adhesions were carefully separated, the tumor was dissected away from its base at the site of the internal ring and the whole mass readily removed. Considerable bleeding from numerous large veins was easily controlled. The raw surfaces were covered by suturing the peritoneum. The left testicle was found entirely within the

abdomen It was of normal size and contour The wound was closed in layers as usual (Fig 510)

The patient made a prompt and satisfactory operative recovery

Pathologic Report —The specimen is a large neoplasm measuring 16 x 14 x 13 cm The anterior surface is covered with

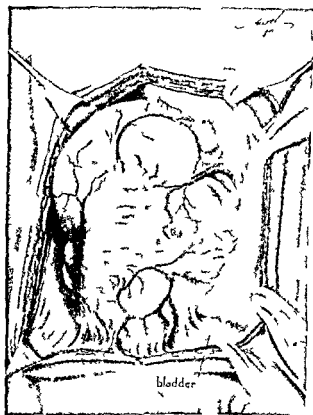


Fig 510 —Showing appearance of tumor *in situ*

dilated veins and a thick white icing The growth is well encapsulated On section a small cyst is found 5 cm in diameter which contains chocolate brown fluid The remainder is solid and fleshy in consistency and yellowish white in color There is a suggestion of testicular tissue in the lower portion of the tumor surrounded by areas of yellow and green necrosis (Fig 511)



Fig. 511.—Appearance of tumor on gross section.

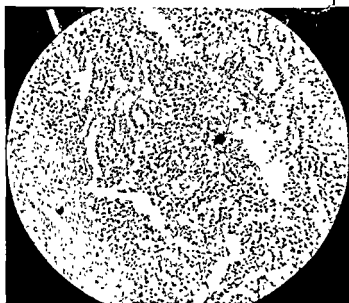


Fig. 512.—Photomicrograph of intra-abdominal testicular tumor showing areas which resemble adenocarcinoma. Magnification  $\times 80$ .

Microscopic section shows a malignant growth with alveolar arrangement. The alveoli contain large conical cells not unlike epithelial cells. There is a considerable amount of stroma. Necrosis is seen everywhere. No normal testicular structure is found (Fig 512).

**Comment**—While the examination of the section suggests large round cell sarcoma and in some areas adenocarcinoma the tumor, in all probability, belongs in the class of so called teratomata as pointed out by Hinman in his classification of tumors of the testicle. The case is presented as the first example of this type of testicular intra abdominal neoplasm which has come under our observation although such cases have been commonly referred to in surgical literature.

Trauma or pinching of the organ within the inguinal canal is said to play an important part in the causation of malignant change in such cases, and yet in this instance both testicles were entirely within the abdomen. The means of injury or trauma to the organ is not easily explainable.

This patient was shown before the New York Surgical Society shortly after his operation in December 1925. It will be noted that he now has a recurrence of the growth of considerable extent within the abdomen and probably originating from the site of its previous attachment to the inner aspect of the internal inguinal ring. This is a recurrence by direct extension and there are no evidences of metastases in other parts of the body. x Ray therapy has been given over a period of several months with no apparent change in the size of the recurrent mass.

At the suggestion of Dr. Westbrook, he entered the hospital on this occasion for colloidal lead therapy which has been administered with much discomfort to the patient, but with very little benefit to or change in the local condition. Although the use of this agent in certain types of malignancy may hold some prospect of future usefulness our own observations on a limited number of cases have been unsatisfactory and discouraging in spite of the apparent excellent results which have been reported by Blair Bell and others. The outlook for this patient is of course, a very poor one.

## REPORT OF 257 GYNECOLOGIC CASES TREATED WITH RADIUM ALONE OR COMBINED WITH SURGERY

WILLIAM SIDNEY SMITH

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WE have been using radium for the treatment of certain gynecologic conditions at The Brooklyn Hospital since January 1, 1921, a period of six years. In that time, 111 cases of chronic metritis at the menopause, 34 of uterine fibroids, 68 of carcinoma of the cervix, 24 of carcinoma of the fundus and 20 miscellaneous cases.

In all of these the radium salt was used contained in two 50 mg tubes. The screens were: A glass capsule, containing the radium, a second capsule of platinum, 1 mm in thickness and a rubber tube 2 mm in thickness, so that our cases have received only gamma rays.

Our technic is to tie a strong silk thread into the eye of each platinum capsule, after which the capsules are placed in a 20 per cent carbolic solution for twenty minutes. The rubber tubing is boiled. A sterile nurse then inserts the radium capsules into the rubber tube, ties off both ends of the tube with silk, leaving a long thread attached to one end. By this means we have a silk thread attached to the rubber tube and to each capsule. The screened radium is now ready for use. After the silk threads are attached to the patient's thigh by adhesive plaster.

### CHRONIC METRITIS

It will be seen that nearly half of our patients were suffering from chronic metritis.

The metritis cases were all past the menopause and gave no history or physical findings of previous inflammatory trouble. The principal symptom was uterine bleeding. They were all subjected to a careful examination under anaesthesia and uterine

curetting The curettings were later examined by the pathologist If the diagnosis of chronic metritis was sustained by clinical findings at the time of operation these patients received 1200 mg hours of radium in one dose in two 50 mg tubes in tandem screened with 1 mm of platinum and 2 mm of rubber Radium was carried well up into the fundus of the uterus and kept there by a narrow strip of dry gauze packed into the cervical canal and the vagina was packed full of dry gauze Patients have not had any difficulty in voiding and we have not used a self retaining catheter as is the custom in some institutions Gauze and radium were removed twelve hours later without difficulty or pain to the patient Our rule is rest in bed for six days

The results have been very satisfactory uterine bleeding stopped in five or six weeks and the uterus gradually has become smaller in all but 5 cases Two cases had a second radium treatment six months to a year later of 1200 mg hours which cured them 2 cases continued to have moderate periods and the fifth case came to a subsequent operation with a very interesting pelvic condition Another case came to operation a year later for appendicitis and as the uterus was large and soft even though there had been no vaginal bleeding the surgeon performed a supravaginal hysterectomy

Of these 111 cases of chronic metritis 15 had the combined treatment of radium and surgery at the same sitting The operative procedure consisted of trachelorrhaphies amputations or repairs of the anterior or posterior vaginal walls In many of these cases the radium was placed in the uterine canal and the rubber tube used as a screen stitched to the anterior and posterior lips of the cervix with a chromic gut stitch This suture was tied with a half bow knot leaving a long end which was carried out of the vagina and attached to the patient's thigh When radium is thus fastened within the cervix and uterus the vagina is not packed with gauze We have had no bad results from not using the gauze packing and the repair operations have healed nicely In this group of 15 cases there is only 1 which had a Byrne cautery amputation of the cervix and of this I will give a more detailed report

Mrs S W, age thirty three Russian was admitted to hospital with history of spotting between periods for two months. Uterus was enlarged and hard with cervix lacerated and eroded. Clinical diagnosis was very early carcinoma of cervix or a chronic metritis with cervical erosions and lacerations. A circular amputation of the cervix was performed with the Byrne cautery knife, leaving  $2\frac{3}{4}$  inches of uterine canal, 2400 mg hours of radium were given within the uterus. The pathologic report stated that the cervix was not malignant. Convalescence was stormy owing to secondary hemorrhage from the cervix. The patient left the hospital in three weeks with the cervix healed and in good condition. Two years later this patient complained of abdominal pain once a month. There was never any flow and no fever; she looked well. Six months later the pain each month had increased and a presumptive diagnosis of hematometra was made, and a laparotomy was performed. The pelvic organs were very adherent, there was a double hematosalpinx of considerable size and the uterus was distended with old menstrual blood. A supravaginal hysterectomy with a double salpingo-oophorectomy was done. The stump of the cervix was split for drainage and the patient made a slow but satisfactory recovery.

Here is a case in which 2400 mg hours of radium within the uterus failed to stop the menstrual periods for more than one and a half years. The menstrual function then slowly returned but as there was a stenosis of the cervical canal due to the cautery amputation, there was no drainage and the blood backed up into the uterus and tubes.

### FIBROIDS

The fibroid cases treated were 34 in number. For the most part, they were small fibroid tumors in the wall of the uterus or small myomas. In only 3 cases have tumors larger than a fetal head been treated, but we have been careful to exclude submucous or pedunculated tumors and those causing pelvic pain. With one exception the patients' ages have been between forty and fifty years. These patients were all subjected to a careful bimanual examination under anesthesia and an intra uterine



investigation with a curet before the radium was introduced into the uterus. The usual radium dose was 1200 mg hours—2 patients received 1600 mg hours 3 received 1800 mg hours and 3 received 2400 mg hours at one session. The results have been excellent.

A twenty six year old woman with a fibroid tumor extending 3 inches above the symphysis was flowing heavily and refused surgical measures. Radium was used after its effect had been fully explained to her. The result of one 1200 mg hour dose was all that could be desired. The flow ceased and the tumor slowly became reduced in size.

I know of only 2 cases where the bleeding did not stop with the single 1200 mg hour dose. In both of these cases the period have been reduced to normal in frequency and amount the uterus remaining about stationary in size.

In one case surgery was combined with radium treatment. A myoma filling the pelvis was treated with a 1500 mg hour dose the tubes being sutured in place and an extensive operation for lacerated perineum and rectocele was carried out with excellent result from both radium and surgery.

Two patients with large fibroids heavy flow and very low hemoglobin have each had a 2400 mg hour radium treatment as a preliminary to a later supravaginal hysterectomy. In each case the flow ceased the hemoglobin increased and the patient became a good operative risk with eventual recovery after hysterectomy.

#### CARCINOMA OF THE CERVIX

We have had 68 cases of carcinoma of the cervix of which 3 were of the epidermoid variety 2 were of the adenocarcinomatous type and 63 were of the squamous-cell type. Grouping these 68 cases in another manner there were 56 which were inoperable that is there was induration in the broad ligaments and some degree of fixation of the fundus together with some degree of involvement of cervix and vagina and there were 12 cases which did not show extension into the broad ligaments so far as could be ascertained.

Making still another grouping of these 68 cases. One received radium treatment and in one month the disease had spread very

rapidly, 2 received radium treatment and two months later were subjected to a total abdominal hysterectomy 8 received a Byrne cautery operation and radium at the same session with or without later x ray treatment, and 57 cases received radium alone or with x ray as a palliative remedy

The case with such a rapid advance of the disease was a widow of thirty nine years with a history of spotting between periods for six months The cervix was eroded only and the uterus mobile She received a 2400 mg hour dose within the cervical canal Cancer of the cervix was suspected and the report from the pathologist confirmed it One month later the cervix was entirely involved She received heavy radium dosage in another hospital, and died four months after the first treatment I do not know whether or not the treatment had anything to do with the rapidity of the course of the disease

Two patients were subjected to radium and total abdominal hysterectomy One was a married woman of forty nine years In 1919 her cervix and perineum were repaired and at that time the pathologist reported that malignancy was suspected in the cervix She was not seen again until 1923, when she complained of flowing and spotting a little between periods On examination, the cervix bled a little to touch and carcinoma was suspected The uterus was small hard and movable and there was no induration in the broad ligaments She received a dose of 2400 mg hours of radium within the cervical canal A section of the cervix was reported by the pathologist to be epitheliomatous Bleeding subsided after treatment Three months later the patient was subjected to a total abdominal hysterectomy Convalescence was uneventful Seven months later she again came under observation with a small hard nodule in the scar in the vaginal vault, the pathologist's report was squamous cell carcinoma A second 1200 mg hour radium treatment was given the tubes being placed in parallel against the scar There was no bladder or rectal discomfort The patient gained 20 pounds in weight and felt well for one year She is now the victim of a hopeless recurrence

The second patient who was subjected to radium and total

hysterectomy two months later was a widow of thirty five years. She complained of profuse vaginal bleeding between periods for two months. On examination in July 1925 the cervix was large, hard and movable. The uterus was small, hard and there was no induration in the broad ligaments. This patient had lost a great deal of blood but otherwise she was not at first suspected of being a cancer patient. She was given a transfusion of 1000 c.c. of blood by the direct method and two days later the interior of the uterus and cervix were investigated.

The pathologic report from the examination of the cervix was epidermoid carcinoma and she was given a dose of 2400 mg. hours of radium within the cervix. Two months later the cervix had shrunk to normal size, there was no vaginal bleeding either on examination or on sponging and there seemed to be normal mobility of the entire uterus.

This patient seemed to be in the operable class and a complete abdominal hysterectomy was performed. The operation went smoothly but it was noted that the right broad ligament was slightly more tense than the left. There was no other gross pelvic pathology observed. Convalescence was uneventful. The pathologist was unable to find any carcinoma in the cervix or uterus and the specimen was reported as a fibrosis case.

Six months after operation the patient was in excellent general health and she had no symptoms of pelvic disease. Pelvic examination was entirely negative for signs of recurrence. Two months after operation the patient complained of pain in the right groin and the right inguinal glands were enlarged and tender. x-ray treatment was advised but the patient refused. It is now eighteen months since the hysterectomy and the patient is rapidly becoming more and more cachectic and she will die in the near future.

Of the 57 advanced cases which received radium as a palliative remedy there were 4 which had had a supravaginal hysterectomy for fibroids from six to fourteen years previously. These 57 cases have had their radium within the cervical canals with the tubes in parallel or in T fashion. They have nearly all had second doses of 2400 mg. hours after an interval of four to

six months, and a very few have been given x-ray treatment across the abdomen

Of this entire group of advanced cases some are dead and some are living. Those that are living will eventually die from carcinoma, but I am of the firm opinion that radium treatment is the best palliative remedy at our command. Life is prolonged, the foul discharge and the bleeding are very much decreased. Pain may or may not be less than without treatment. The patients gain in weight, they are able to carry on their daily duties, and they really feel as though something had been done for them. If this much can be accomplished for these poor unfortunates, I think that you will agree that this form of treatment is worthwhile.

Eight cases received the Byrne operation and radium. In this group, 2 cases had the cautery operation first, radium treatment following in nine weeks and eleven months, respectively. The other 6 cases had the Byrne operation and radium at the same session. Of this group of 8 patients, 1 died of recurrence two years after the first treatment, 1 has been lost as far as follow up is concerned, 1 is in apparent good health three years after treatment, and the other 5 cases will be reported in detail, for they are of considerable interest.

One case came under observation on July 18, 1921, five and a half years ago—age forty-three, pale, thin, and bleeding profusely. Examination of the cervix revealed a large cauliflower growth on the posterior lip. The uterus was mobile, and it was possible to pull down the cervix, and to get around it with the cautery knife. She received a Byrne operation, leaving  $1\frac{3}{4}$  inches of the uterine canal. One tube of radium was placed in the canal and one tube was placed crosswise in the crater. The pathologist reported squamous cell carcinoma. Convalescence was stormy, due to a secondary hemorrhage. Two weeks after discharge the patient was readmitted to the hospital suffering from another hemorrhage. On discharge she went to The Home for Incurables, after about three months she began to gain in weight and color, and six months later she was discharged from the Institution because the authorities there considered her too

healthy to be retained as an inmate. It is now five and a half years since this patient was treated. She is in excellent physical condition and there is no evidence of cancer in her pelvis.

The second of these cases was a married woman of thirty seven who came under observation on June 15 1921 with an epidermoid carcinoma of the cervix. Her history was menorrhagia for four months spotting between periods and some loss of weight though she was not cachectic. The cervix was lacerated eroded bled easily to touch and the uterus was large and movable. The Byrne cautery operation was performed and 2400 mg hours of radium given at the same session. One tube was placed in the canal and one crosswise in the crater. Convalescence was stormy due to two secondary hemorrhages. The patient finally left the hospital in good condition. Four months later she was readmitted with a spotting history. She looked very well the uterus was freely movable and felt like a round ball in the pelvis. The uterine canal was easily dilated and two radium tubes were inserted in the canal in tandem. Total dose 600 mg hours. Since that time this patient has had no spotting or discharge. The uterus is freely movable and the patient feels well and attends to her household duties. It is now five and a half years since her last treatment and she gives no evidence of cancer anywhere in her pelvis.

The third case in this group of 5 was a married woman of forty five who came under observation May 21 1920. She had a bleeding cauliflower mass on the cervix and a uterus which was not entirely mobile. The report from the pathologist was squamous cell carcinoma. A Byrne cautery operation was performed leaving a uterine canal 2 inches in length. She did not have radium treatment at that time because we did not have any radium in our possession. Convalescence was easy prognosis was bad and her family were told she might live six months or a year. Two months later she suffered severe pain at her periods due to stenosis of the uterine canal. One dilatation of the canal cured the trouble. The patient gained in weight and felt well for one year then she noticed spotting between periods. Examination showed a hard nodule

in the scar of the Byrne operation. Section of the nodule was reported as squamous cell carcinoma. The uterine canal was dilated and one tube of radium was placed within the uterus and one tube crosswise against the nodule in the vault of the vagina. Dose 220 mg hours. Her periods and all staining ceased. The patient had no complaints for two and a half years. She then became ill with severe abdominal cramps and some hours later a heavy flow appeared lasting four days and resembling menstruation. Examination elicited no signs of extension of the disease. Six months later a similar attack occurred. She was readmitted to the hospital and examined under anesthesia. The uterus was large and the pelvis free and clear except for scar tissue due to the original cautery operation. The uterine canal was identified with difficulty and dilated. A small amount of thin serous fluid escaped from the uterus. Exploration of the uterine cavity with a curet produced little or no material. Two 50 mg tubes of radium in tandem were placed within the uterus. Dose 2400 mg hours. Since that time three years ago the patient has been in excellent condition. There have been no more attacks of bleeding and no discharge. There has been no change in the vagina and uterus on palpation. On inspection there is a small red area at the entrance of the uterine canal. This area does not bleed on sponging and it is soft to touch.

I think the last two attacks of bleeding were a beginning return of ovarian function and the pain was undoubtedly due to a stenosis of the opening of the uterine canal. I doubt very much whether radium had anything to do with the secondary hemorrhage reported in these cases. I rather think they are due to the high Byrne cautery operation which may have been done too rapidly or with too great a degree of heat.

For these hemorrhages our treatment has been a free use of morphin and raising the foot of the bed.

These 3 cases have been examined by the attending surgeon and his associate of our hospital staff and they agree that the patients are in excellent physical condition and show no apparent trace of a recurrence of the disease.

The fourth case was a widow of fifty five who came under observation in August 1923 three and a half years ago with a bleeding cauliflower growth which was situated on the posterior lip of the cervix and was invading the vaginal wall to a slight degree This patient had had twelve children and had passed through her menopause nine years previously There was a history of spotting and bloody discharge of one year's duration The uterus was of normal size The cervix had some restriction of motion Pathologic examination proved the growth to be a squamous cell carcinoma She was subjected to a Byrne cautery operation leaving a uterine canal which measured  $1\frac{1}{2}$  inches One 50 mm tube of radium was immediately placed in the uterine canal and one 50 mm tube was placed crosswise in the crater The dose was 2400 mg hours On the fourteenth day after operation she had a rather severe secondary hemorrhage After leaving the hospital the patient received four x ray treatments across the abdomen Each treatment caused a more severe reaction than the one preceding and they were discontinued The patient was pale thin weak and looked bad Five months after the first treatment the remains of the cervix and uterus were fixed and the pelvis was filled with a mass of stony hardness A second dose of 2400 mg hours of radium was given within the cervix crater Four months after the second dose the patient began to improve in appearance and to gain weight She complained of bladder pain and frequency of urination and undoubtedly there was a small vesicovaginal fistula present The patient slowly continued to gain in weight and strength and for the last six months she has been a very active member of her household The bladder and fistula symptoms have almost entirely disappeared

The fifth case in this series was a married woman of fifty five years who had had two children Her menopause occurred twelve years previously She gave a six months history of spotting and bloody discharge On examination the cervix was hard and fixed It bled on digital examination The uterus was small hard and movable Clinical diagnosis was carcinoma of the cervix but unfortunately a section was not taken for mi

croscopic examination. As this cervix would not pull down, it was impossible to do a true Byrne operation. A crater was discovered within the cervix, and the latter was coned out with the cautery, leaving only a shell of cervical tissue. This slow cauterization or roasting process was continued for forty minutes, and radium was immediately inserted. Two 50-mm. tubes were inserted in tandem within the cervix and uterus. The dose was 2400 mg. hours.

Two months later the patient was losing weight and complaining of some foul, bloody discharge.

Four months after the treatment she was steadily losing ground. Pelvic pain was severe; weight loss continued, and the pelvis was filled with a mass of stony hardness. The cervix was filled with greenish radium slough.

Ten months after her treatment the patient began to improve. Weight was gained, pain disappeared, and the cervix healed. The uterus could be outlined and it was slightly movable.

Thirteen months after operation this patient was in excellent physical condition. She was working every day and had no complaints. Pelvic examination showed a uterus which was small and freely movable, and it showed a cervix which was very small and healed. It is too soon to talk much about this patient's ultimate course, but the case is mentioned on account of its remarkable progress up to date.

#### ADENOCARCINOMA OF THE CORPUS UTERI

Of the 24 cases of adenocarcinoma of the corpus, 13 were advanced, and 11 were fairly early cases; that is, the fundus was movable, and there was no demonstrable induration in the broad ligament. All of these patients were between thirty-eight and sixty years of age.

The advanced cases were given 2400 mg. hours of radium within the uterine canal. Three of these cases had abdominal x-ray treatment, and 10 did not have it. Five of this group were operated upon. At the time of operation, however, it was found that metastasis had occurred in the tubes, and so I have classed



them as advanced cases Four patients had a second 2400 mg hour radium treatment six months after the first and 1 patient has had three such treatments Of these 13 advanced cases 9 have died 3 have disappeared and 1 is living nine months after her radium treatments

We feel quite certain however, that radium has relieved this group of women of considerable bleeding much foul discharge and prolonged their lives

Of the 11 cases where the uterus was movable, and no broad ligament induration or metastasis was grossly demonstrated all received a 2400 mg hour dose of radium within the uterus Ten of these cases were subjected to a complete abdominal hysterectomy six weeks after their radium treatment and one was not operated upon because for cardiac reasons she was a poor operative risk Six of these 11 patients are alive and apparently healthy two to six years after their radium and hysterectomy Of these 6 patients 1 was operated five and a half years ago 1 four years ago 2 three years ago 1 a trifle more than a year ago and the sixth case was a poor operative risk and she received 2 doses of radium but no operation Three of these 11 cases have disappeared and we are unable to trace them and 2 of the group died a few days after operation In 1 the cause of death was a pulmonary embolus and in the second case death was due to cardiac disturbance

In this group of 11 cases of which I have been speaking there is 1 which will be reported in detail because her abdomen had been opened and her uterus and ovaries inspected two weeks before her radium treatment She was then subjected to a total abdominal hysterectomy six weeks after her radium treatment and her pelvic organs were again inspected and sent to the laboratory for section

Miss Y thirty eight years school teacher was admitted to the surgical service with the symptoms of chronic appendicitis, and the history that her periods had been profuse for several years, and that she had been spotting between periods for three months She was curetted and a laparotomy was performed for chronic appendicitis and retroversion When the abdomen was opened the

uterus was a bit large, congested, and retroverted, both ovaries were large and congested; the broad ligaments soft. The curettings, which had not excited suspicion on gross inspection, were reported as adenocarcinoma by the pathologist. Two weeks after the laparotomy she was given 2400 mg. hours of radium within the uterus as a preliminary to total abdominal hysterectomy performed six weeks later. At this last operation the ovaries on gross inspection were small and atrophied. On opening the uterus it was possible to see where the radium capsules had been placed, and no carcinoma could be seen in the gross. She is apparently well at the present time.

The pathologist's report is as follows:

*Specimen.*—Uterus, ovaries, tubes.

*Pathologic Diagnosis*—Carcinoma of uterus; localized acute and subacute endometritis (radium).

*Macroscopic Examination.*—The fundus consists of firm, whitish tissue, the fibers arranged in whorls. This area is indistinctly demarcated from the surroundings; it appears to be carcinomatous. There is a patch 1 cm. in diameter on the endometrium of the lower part of the body of the uterus consisting of soft, yellow fibrin. It is surrounded by a zone of congestion. The tubes and ovaries appear normal, though ovaries are small and atrophied.

*Microscopic Examination.*—Ovary: No pathologic changes are evident. The fibrinous patch on endometrium consists of fibrin containing many polynuclear cells. Beneath it is a zone containing young fibroblasts and polynuclear cells. Under one end of the patch is a dilated gland, with bizarre epithelium. It appears to be altered in the inflammatory process rather than malignant. In places the leukocytes are fragmented and necrotic. No mucosa present. In some places beneath the fibrin, and extending into the muscular wall, are nodule accumulations of round cells about groups of giant-cells, the whole suggesting a tubercle. The blood-vessels beneath this inflammatory zone are thick walled, the intima being chiefly involved. The process in this region appears to involve essentially a destruction of the mucosa and the underlying tissue, including the blood-vessels of all sizes with an in-

untoward effect on bladder and rectum and produces very little troublesome leukorrhea. If the radium is used in the vagina without careful protection of bladder and rectum it will cause a reaction but not nearly so disastrous as would be the case if beta rays were used.

2 That the temperature reactions occasionally seen are more likely to be due to a fresh invasion by organisms started by the curetting and blocked drainage than to radium.

3 That radium alone is an excellent treatment for chronic metritis and small fibroids at the menopause age curing most of the cases with one 1200 mg. hour dose but that even a 2400 mg. hour dose will not always control the bleeding indefinitely in all patients. Ovarian function may return.

4 That plastic operations on the cervix and perineum may be performed with excellent results at the same time that radium is applied to the interior of the uterus.

5 That for advanced cases of cancer of the cervix and corpus radium as a palliative measure gives more relief than any other measure at our command. I doubt if heavily screened radium alone is curative even in early carcinomata.

6 That in early cervical cancers the Byrne cautery operation and radium at the same session with or without x ray treatment later give results which are so valuable that it should be thought fully considered as a possible standard method of treatment.

7 That it is impossible to forecast how much or how little radium will accomplish for any particular patient suffering from cancer.

## GAS BACILLUS INFECTION COMPLICATING SENILE AND DIABETIC GANGRENE

E. K. TANNER

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WITH the experience in its recognition and treatment gained in the late war gas gangrene has become much better known and is now recognized as a not infrequent incident in the surgery of civil life. Surgeons are recognizing and treating many cases of this condition resulting from crushing injuries and compound fractures. It is our purpose to call attention to infection with the Welch bacillus as a fairly frequent complication of arteriosclerotic and diabetic gangrene of the lower extremity.

The Welch bacillus is a common inhabitant of the intestinal tract of man and animals and as a result has a very wide distribution which must be considered in any contamination of tissues with dust or filth. The foul ulcers often found in connection with gangrene of the foot are frequently associated with lack of personal hygiene and therefore may very readily become infected with this organism or its spores. The superficial tissues exposed to the air are, however, not a favorable site for growth of anaerobic organisms, the ulcer may therefore show no clinical evidence of gas gangrene but the possibility of the bacilli being present should be kept in mind by the surgeon.

We wish to report briefly several cases of Welch bacillus infection complicating senile and diabetic gangrene of the lower extremity which have been under our care in this hospital during the past few years.

Case I—Italian female aged fifty three years admitted January 7, 1921 with moist diabetic gangrene of the foot and a sloughing ulcer on the dorsum of the foot. *Staphylococcus aureus* cultured from the ulcer. Anaerobic culture not taken.

Amputation below the knee January 17th followed by gas gangrene of the stump on the second day Welch bacillus proved by rabbit inoculation Reamputation above the knee, and tetanus perfringens serum given, 100 c c , repeated in twelve hours and then daily to a total of 500 c c , with complete recovery

Case II —Austrian Hebrew, male aged sixty eight years, admitted March 25, 1921, with arteriosclerotic gangrene of the foot and ulceration No culture taken from the ulcer Amputation below the knee March 28th Gas gangrene of the stump with Welch bacillus demonstrated by the third day A total of 600 c c of serum given, with complete check of the gangrenous process A disarticulation of the knee was done April 8th but the patient's poor condition did not permit of a thigh amputation He died of nephritis and exhaustion April 27th

In neither of the cases was Welch bacillus looked for before amputation, and only by development of gas gangrene in the amputation stump was its presence suspected

Case III —Hungarian Hebrew, male aged forty eight years, admitted September 29, 1921, with diabetic gangrene of great toe Severe diabetes Wassermann negative October 14th left great toe amputated but gangrene was progressive Culture showed Welch bacillus, and a thigh amputation was done October 28th, the perfringens serum being given the same day in one dose of 100 c c No further sign of gangrene appeared, but the diabetes was uncontrollable, and the patient died in coma November 11th

Profiting by our experience in the previous cases we identified the gas bacillus in this case before amputation and gave the serum

Case IV —White, female aged seventy eight years admitted April 10, 1922 with arteriosclerotic gangrene of great toe and ulcer on dorsum of foot Wassermann negative Ulcer showed *Bacillus welchii* on anaerobic culture 100 c c of perfringens serum given April 16th, and thigh amputated the next day

Never any evidence of contamination of stump and patient recovered

Case V.—White, female, aged sixty years, admitted July 21, 1925 with diabetic gangrene of the great toe. Very marked diabetes. Treatment for the diabetes while waiting for a line of demarcation to form, but there being no improvement, 50 c c of serum were given, and the thigh amputated September 2d. Smears and culture taken from the gangrenous tissue of the toe just before amputation failed to show Welch bacillus, but at least spores must have been present, for the reason that nine days after operation the patient showed signs of gangrene in the stump, and the *Bacillus welchii* was then readily found. A total of 400 c c of the serum completely checked the gangrene, and the necrotic tissues separated. The patient, however, died from her diabetes and exhaustion on October 21st.

Either the 50 c c of serum given this patient was not sufficient or the immunity was brief, the gangrene of the stump manifesting itself after we felt that the margin of safety was in the patient's favor.

Case VI.—White, female, aged sixty five years, admitted August 16, 1925, with diabetes and a blister like infection of the outer border of the foot of four weeks' duration, a sloughing ulcer being present when admitted to the hospital. A frank gas infection developed in the foot with typical signs. The foot was opened widely on August 17th, and a total of 400 c c of perfringens serum given in the next three days, with control of the gangrene. Welch bacillus identified. On August 28th a thigh amputation was done, with recovery. No gas infection of the stump, the serum apparently having conferred immunity.

Case VII.—An Italian, aged fifty seven years, now in the hospital, admitted December 27, 1926, with gangrene of the great toe extending to the dorsum of the foot. Amputation below the knee December 30th. Gangrene promptly developed in the stump. Welch bacilli identified January 3d. A total

of 200 c c of serum in three days stopped the gangrenous process and the stump is now healing by granulation with no further trouble

These illustrative cases would seem to prove that in any case treated for gangrene of the lower extremity the chance of contamination with Welch bacillus must be kept in mind. Even though the bacilli are not found in the original focus the stump should be watched carefully for this development. Other bacteria are as a rule also present but gas bacillus is the important factor in the gangrene of the stump inasmuch as the circulation was good in each case and in several instances the gangrenous process seemed to be definitely checked by the use of the serum.

Effort to recover the organism from the vessels of the amputated limb failed but we feel sure they must have spread up the leg by way of the vessels or lymphatics to the site of amputation rather than by way of the muscle and fascial planes as is usual in this type of infection. In each case the most rigid aseptic technic was carried out in sterilization of the skin and the gangrenous foot was not uncovered in the operating room.

These patients are always bad risks because of their constitutional disease and need most careful handling but this particular complication seems to be largely controllable provided its possible occurrence be kept in mind.

## THE OPERATIVE TREATMENT OF VARICOSE VEINS

E K TANNER AND WILLIAM H FIELD

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VARICOSE veins of the lower extremities have received much attention from surgeons, and there have been many conflicting theories advanced as to causative mechanism with many types of operation based on these theories. We shall not discuss these theories at present, but shall speak briefly of the methods used in this hospital in the treatment of varicose veins.

We do not feel that the mere presence of varicosities without subjective symptoms is an indication for operation. Our chief indications are pain on standing, edema, and eczema or ulceration of the skin. Any or all of these symptoms when varicose veins are the cause, we believe can and should be relieved by operation, provided the constitutional condition of the patient justifies operation. If phlebitis be present, this should be allowed to subside, and ulcerations be healed, if possible, before operating. A period of rest in bed with elevation of the legs will best accomplish this. In case of phlebitis foci of infection elsewhere in the body should be sought as the source of the metastatic infection in the vein.

The treatment of varicose veins in this hospital follows closely the method worked out many years ago on the service of Dr J E Jennings. It consists essentially in the complete removal of the long saphenous vein from ankle to femoral ring in all cases where extensive varices are present. In addition, markedly dilated branches are removed, including also the external saphenous when involved. The object is to interrupt the circulation as completely as possible in all the dilated superficial veins, diverting the blood flow to the deeper system.

We have found the various types of multiple ligation or removal of short sections unsatisfactory, as there are always enough



collateral communications with the remaining portions of the vein and especially from the deep system by way of the perforating branches to continue most of the symptoms. Of course there are cases where such extensive removal is not indicated in which one or two branches only are dilated and giving symptoms or in the fairly common type of varicosity of the external saphenous only with a perfectly healthy and competent internal saphenous and no evidence of venous stasis in the leg. In such cases removal of the dilated branches alone will usually give relief but the varicose disease is apt to be progressive and further work may need to be done a few years later. The deep veins never seem to become varicosed or at least never give symptoms as they are well supported by muscles and fascia.

As to technic of operation—when the constitutional and local conditions are satisfactory the limb is carefully prepared for operation from the toes to well above the groin including shaving the pubes. The veins are removed when possible by the subcutaneous stripping method. This stripping is done by means of a vein probe having at one end an olive tip small enough to be passed through the lumen of the vein and at the other end a large conical tip with a cup shaped base. This tip is so large that it cannot possibly invaginate even the most dilated vein. We have found for this large tip the sizes  $\frac{5}{8}$  and  $\frac{3}{4}$  inches in diameter the most useful. We use two lengths of probes 34 inches which will take the whole length of the internal saphenous and 18 inches which is more convenient for the branches (Figs 513 514).

Formerly a modification of the Babcock probe with a small olive tip at each end was used. This removes the veins by invagination and is very satisfactory if the vein walls are strong enough to stand the pull but a friable vein will break. With the modification of a large following end there is no pull on the vein but the cup shaped bulb carries the whole vein ahead of it as it is pulled through removal being much more satisfactory. We are frequently able to remove the whole length of the internal saphenous from ankle to femoral ring with but the two small incisions.

The probe passes best from below upward, as it is less likely to enter branches. We prefer to ligate and sever the vein at its upper end before passing the probe, because of danger of the probe otherwise dislodging thrombi which might pass into the general circulation (Figs. 513, 514).



Fig. 513—1, The vein as it comes through on the stripper 2, Same vein pulled out to its full length

With the extremely tortuous veins sometimes encountered, it may be impossible to pass the probe for their whole length. If so, other incisions are made wherever a stop is met, and the vein removed in sections. Even when this is necessary, there

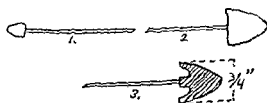


Fig. 514—1, Small olive tip 2, Large tip. 3, Cross section of large tip.

will be much less scarring than in an open dissection. The most common points of obstruction are at the sites of previous ulceration or phlebitis, and behind the internal condyle of the femur. Markedly varicose branches are removed in the same way.

Some areas may need open dissection. Bleeding from the broken off branches is never troublesome. The leg is elevated, clots are pressed out, the incisions sutured, and tight compression bandages applied the whole length of the limb. The patient is kept with the foot of the bed elevated for two or three days, and we are never troubled with hematomata of any size.

These patients are usually given about two weeks in bed and then gradually allowed to walk about. Compression bandages should be worn for three or four months until the deeper veins have fully accommodated themselves to the increased flow of blood and the tendency to edema is overcome.

The gratitude of these patients for the relief afforded by their operation is very pleasing to the surgeon. Subsequent treatment is seldom needed, except in cases of an incomplete operation.

This brief report covers the 52 consecutive cases of varicose veins operated upon from January, 1920 to November, 1925 at The Brooklyn Hospital. There was no mortality.

The cases were evenly divided between males and females. One patient was nineteen and 1 sixty four. Between these extremes 11 were twenty to twenty nine, 14 were thirty to thirty-nine, 17 were forty to forty nine, and 8 were fifty to fifty-nine.

Both lower extremities were operated on in 31 patients, the right lower extremity alone on 13, and the left alone on 8. Total operations 83 extremities on 52 patients.

The duration of symptoms varied from one to twenty five years plus, the average being nine and eight tenths years.

Twenty two cases, or 42.3 per cent, had ulcer of the leg present on admission, or a scar and history of past ulcer. Three had a cellulitis of the leg.

Pregnancy was mentioned in the history as a causative or increasing factor in 6 cases.

Typhoid and scarlet fever were given as the cause in 2 cases each, and an attack of acute cholecystitis in 1 case.

Wassermann tests were negative in 9 cases, ++ in 1, and not done in 42 cases.

**Operations**—Stripping of the internal saphenous vein as described by Dr Tanner was done on 56 of the total 83 extremities operated upon. In 21 of these 56 cases, branches of veins were locally excised also. On 20 extremities local excisions of branches alone were done. Seven had ligations alone at the internal saphenous and along the course of the veins. Extensive ulcers were excised in 2 cases.

Forty-one cases healed without delay, 11 secondarily.

The longest stay in bed was twenty nine days, the shortest, four days. Five were out of bed within the first week. The average for the 52 cases was twelve and six tenths days.

*On follow up*, 23 cases could not be found. The remaining 29 or 56 per cent, are here summarized. Nine reported for examination for less than one year, and were then lost. They averaged about five months. The average for the 29 cases was twenty two months.

Twenty four patients, or 82 per cent of those followed, considered their operations entirely satisfactory. Several of these showed on examination dilated branches but were having no symptoms. Of these 24 13 were operated on both sides 9 on the right and 2 on the left only. There were 4 patients upon whom bilateral operations had been done each of whom reported symptoms at follow up on one side only. One complained of swelling of the right leg following operation. This was one of the cases that was lost track of in the first year. When last seen the swelling was decreasing. Another patient complained of a tender cord on the right side persisting four years after stripping, pain being referred to the ankle when the cord was touched—apparently due to involvement of the cutaneous saphenous nerve. Another patient complained of moderate persistent swelling of the left leg. Still another two years after stripping had been done on the right side and a local excision of a popliteal branch on the left returned with an excellent result on the side stripped but with a large tortuous but painless vein at the site of the excision in the left popliteal space.

One case who was considered such a bad general risk that only a ligation under local anesthesia was done at the left saph

enous opening, received no benefit therefrom and is rated a complete failure

We feel, in following these cases, that the stripping of the internal saphenous vein, using supplementary local excisions of branches where indicated, is the most satisfactory and safest procedure

## A BENIGN SOLID TUMOR OF THE OVARY

VICTOR L. ZIMMERMAN AND GEORGE G. COCHRAN, JR

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A SOLID ovarian tumor of great size is of sufficient rarity to attract immediate attention, and necessitates very close scrutiny into its histologic structures, both from the standpoint of its classification and for its proper surgical treatment.

Such a tumor occurred in a multiparous married woman, twenty six years of age, who entered The Brooklyn Hospital in September, 1926. Her chief complaint was a gradual enlargement of the abdomen of one and a half years' duration.

**Present Illness**—About eighteen months ago the patient first noticed an indefinite lump in the right side of the abdomen. Since that time the mass had gradually increased in size, until she was about the size of a full term pregnancy. There has been no pain except during menstruation. As the tumor grew larger there was noted an increasing frequency of urination and obstinate constipation. During the past few months the patient has lost 5 pounds in weight and has become progressively weaker.

The menstrual, past, and family histories were essentially negative.

**Physical Examination**—Temperature, pulse, and respiration were normal. Systolic blood pressure was 100, diastolic, 70. The general appearance was a young woman apparently not acutely ill, but appearing to have lost weight.

Abdominal examination revealed a large, smooth mass, extending from the symphysis to the ensiform cartilage, almost completely filling the abdomen. The tumor was symmetric, smooth and of hard consistency. Palpation allowed both poles to be identified, giving the impression that the mass was pedunculated. No fetal heart was heard and no fluid wave detected.

Bimanual examination seemed to show that the mass was continuous with the cervix. Posterior to the cervix there was an irregular nodule which was hard and tender. The cervix was a trifle soft.

x Ray, Wassermann, urine, and blood examinations were negative.

**Preoperative Diagnosis** —Solid tumor of pelvic origin.

**Operation** —Ureteral catheters passed prior to starting anesthetic for ureter identification. Median incision 8 inches long and a hard, mottled, grayish tumor exposed, the hand could easily be passed freely about the tumor. There were no adhesions except in the pelvis. The fundus was normal in size, with a pedunculated fibroid about the size of a baseball, arising from the posterior surface of the fundus.

The tumor was rough and non adherent. The right adnexa were free and apparently normal. The large tumor mass was attached to the left broad ligament, and the diagnosis of solid tumor of the ovary was made, and, as the tumor grossly appeared malignant a complete hysterectomy was done. There were no mesenteric glands palpable.

Convalescence was afebrile and uneventful, the wound healing by first intention. Vaginal examination on discharge from hospital showed considerable induration, no tenderness, and the vaginal vault was healed.

**Pathologic Report** —Diagnosis Adenofibromyoma of ovary.

Ovarian growth weighs  $13\frac{3}{4}$  pounds and measures  $29\frac{1}{2} \times 23 \times 23$  cm. It was well encapsulated. Capsule is thick, fibrotic, and smooth. It shows numerous dilated blood vessels. Cross section shows a hard, diffuse growth of shiny white color. There is a great deal of homogeneous hyaline material. Grossly, no particular structure can be seen.

Microscopic sections show a diffuse connective tissue growth, the cells of which are arranged in bundles running in all directions. There are also small cavities which suggest glandular structure lined by cylindrical epithelium. The cells of the diffuse growth are small and spindle shaped. They are regular in size and shape, and show no mitotic figures. There is a great deal of interstitial

tissue, which is partly hyalinized and partly myxomatous. Van Girsón's stain shows that the spindle-cells are partly fibroblasts, partly smooth muscle-cells.

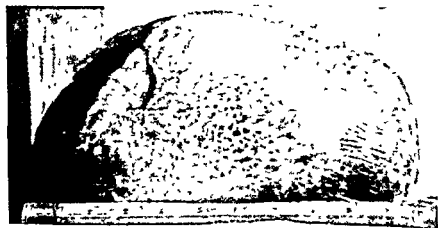


Fig 515—Exterior of growth oval shaped, smooth capsule

The small pedunculated mass arising from the uterus was definitely a fibromyoma, otherwise the uterus, right tube, and ovary showed nothing unusual



Fig 516—Cross-section of growth showing its solid character.

Follow-up examinations on November 23d and December 28, 1926 showed a well-healed abdominal scar. Bimanual examination revealed a soft vaginal vault, with no masses and no area of



induration. The patient's general condition was excellent; she had gained weight, and had no complaint of any kind.

The first close study and definite classification of these solid ovarian tumors was made by Pfannenstiel, who divided them into parenchymatous and stromatogenous types. In a very comprehensive paper upon this subject read before the New York Obstetrical Society in 1923, Samuel H. L. Geist elaborated upon this classification. The parenchymatous group would in-



Fig. 517.—Low power photomicrograph showing diffuse connective tissue. The spindle cells arranged in bundles and running in all directions.

clude all the carcinomata and those cystic growths which later develop carcinoma either in their wall or papillae. In some of these tumors the cystic portions may predominate, but for the sake of simplicity they have been considered in the solid groups. Here also dermoid cysts that develop carcinomata, as well as the so-called teratomata, may be included, although their histogenesis is somewhat different.

In the stromatogenous class are listed Fibroma, fibromyoma,

and carcinoma of various types; endothelioma, angioma, chondroma, and myoma.

Fibroma and fibromyoma are not common in the ovary, comprising 1 to 2 per cent. of ovarian tumors. The malignant stromatogenous tumors, as the sarcomata, grossly resemble the benign, in that they are solid, smooth or slightly nodular tumors, which, while growing more rapidly than the benign

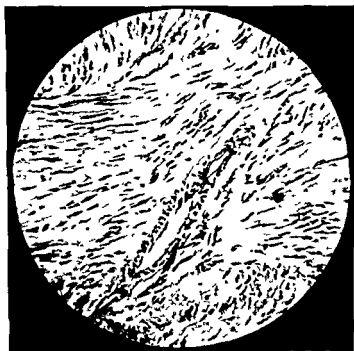


Fig 518—High power photomicrograph. The small spindle-cells are surrounded by hyalinized interstitial tissue, there is some necrosis and myxomatous degeneration. The glandular elements of the tumor are lined with cylindrical cells.

tumors, they tend to maintain the shape of the ovary or mimic a kidney in gross outline. Microscopically the fibromyoma also resembles the spindle-cell sarcoma, but the muscle-cells in the myoma are usually larger and the nuclei small and more rod-like than in the spindle-cells of the sarcoma. In the myosarcoma, however, one gets true malignant cells which differ from the normal cells above described, and approximate those of

the typical sarcoma. The spindle cell type presumably arises from the stroma.

These tumors usually occur in women in early life and the question at once arises as to how they should be treated radically on the operating table. Elot Bishop in a paper at this same symposium, summarizes by saying "Treatment may be conservative or radical. In the former event with grave risk from recurrence and in the latter event with the minor risk of sterility and unsexing."

